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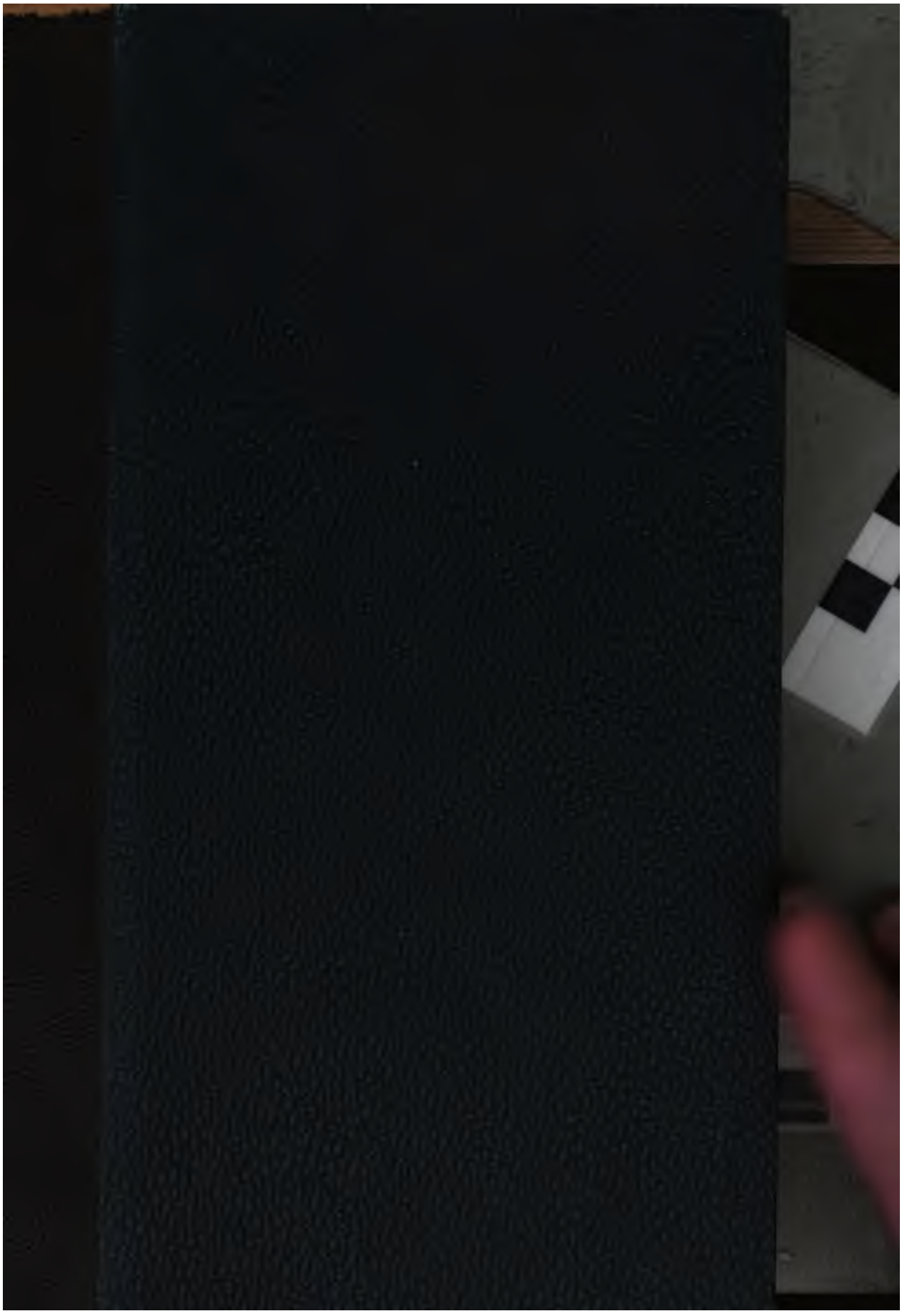

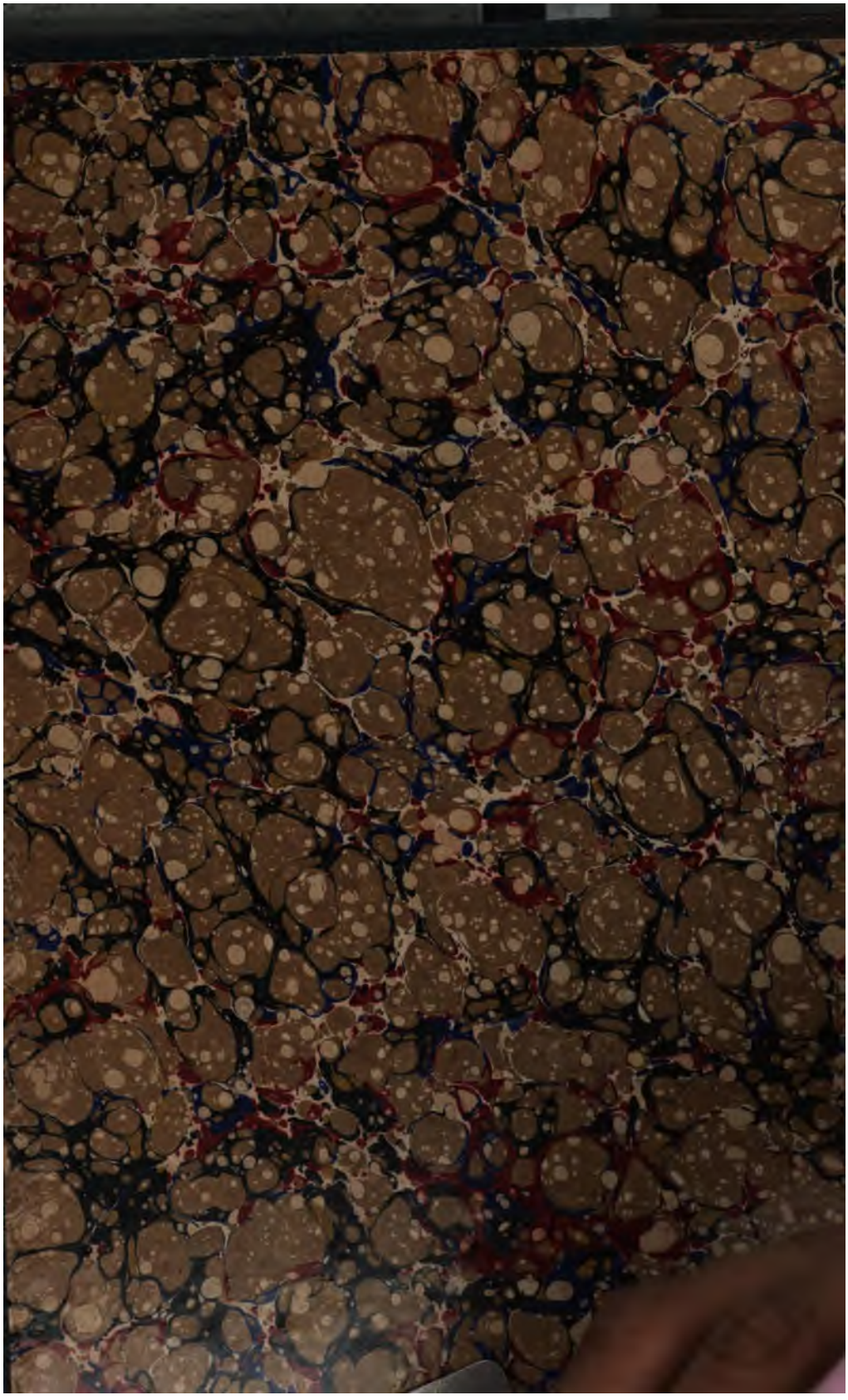

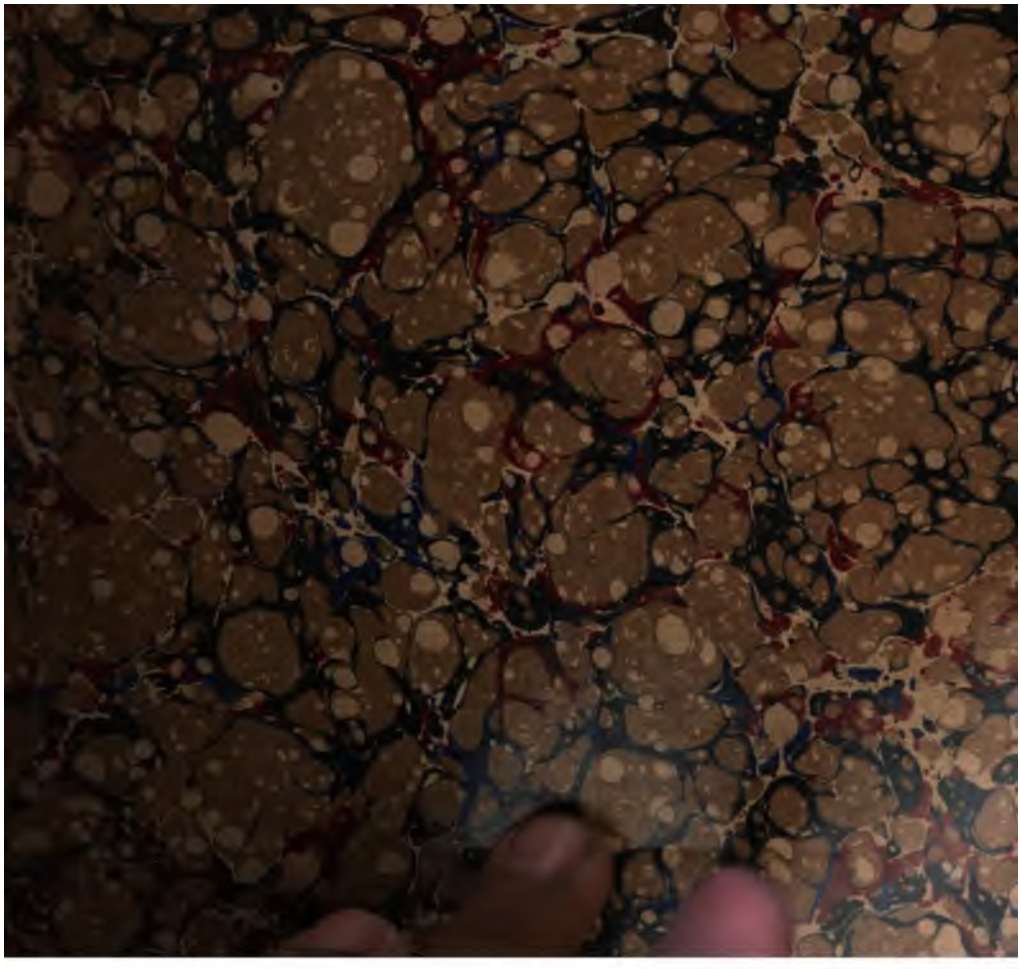

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THE MONIST

A QUARTERLY MAGAZINE

DEVOTED TO THE PHILOSOPHY OF SCIENCE

VOLUME XX.

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THE MONIST

TRUTH.

Πάντων μέτρον ἄνθρωπος·
ἀλλ' ἀνθρώπου μέτρον τὸ Ἓν καὶ Πᾶν.

Truly, the measure of all things is Man;
But Man is measured by the One and All.

Man is a microcosm, and he grows
Unto the stature of full manhood, only
When to the One and All his soul responds.
There is a gauge that measures man, a norm
By which the truth that's in him must be tested.
T'is the Eternal in the change of time,
It is the Law, the Uniformity,
It is the One in this great All,—t'is God!

Mind you, t'is Man, not men, that measures things;
Not I, nor you, nor any other being;
Man only, Man alone.
And what is Man?
Man is the type of mankind,—men's ideal;
Yea, men's ideal!—
Are ideals sham?
Deem you that only things concrete are true?
O, learn to prize the power of ideals
Which more efficient is than Nature's forces
And stronger far than footpound-energy.

Ideals are the factors of man's life;
They are no vain illusions, they are real,
Nay, superreal. Yea, they are Man's guides,—
And they, like guardian angels, help him find
The pre-determined goal of cosmic life.

Man, the ideal, is no transient thing:
He is the cosmic law assuming flesh,
The norm of being in a creature's garb,
An incarnation of the Deity,
Of that All-One which shapes and moulds the world,
Which manifests itself in motes and stars,
And thrills through all their uniformities.
T'is Man, not men, in whom the glory dwells
Of the great One in All,—the Man of Truth.

"Truth changes," sayest thou, and thou art right,
And man himself is changing with his truth.
Both change! for nothing is at rest
In this corporeal world of flux. And yet
Beware lest half-truths lead thy mind astray.

Truth changes as our knowledge broader grows,
As science gains in depth and definition;
But verily the new and broader Truth
Will never call the older Truth a lie,
For lo! it is the selfsame older Truth
As from a higher standpoint it appears,
And all the truths are after all but one.

Truth is no idol, nor an errant light,
T'is not an *ignis fatuus,* no comet.
Truth is a guiding star, a bright ideal,
And like the sailor's compass on high seas,
It leads us gently onward, step by step,

With duly firm-prescribed approximations,
On its own path in definite direction.

Truth is beheld by mind, not by the senses,
T'is not a thing which merchants keep in store,
T'is no commodity which we possess.
Truth is a superhuman power, and
From generation unto generation
Truth marches on, unfolding and revealing
The wondrous mysteries of cosmic life.

Truth is too great that ever it be final.
But Truth remains the Truth e'en though its work
Can never be completed, never finished.
Truth is not untrue, it is not a sham,
Because its resources are ne'er exhausted;
Because its duties, constantly renewed,
From day to day enlarge our field; because
One goal attained entails still further tasks,
And so before our raptured vision stretches
The promised land of vistas infinite.

Truth is life's factor and determinant,
And we are workers in Truth's noble cause.
We yearn for Truth, we need its light; and Truth
Enters our Soul; it takes abode in us,
And consecrates our lives to higher service,
Not we own Truth, t'is Truth that owneth us.

Search for the Truth! Truth's problems are not vain.
Love thou the Truth! trust Truth, and live the Truth!
Walk on Truth's path and Truth will guide thee right.

PAUL CARUS.

THE PERSONALITY OF JESUS IN THE TALMUD.

INTRODUCTION.

JESUS as represented in the Talmud is a subject which must interest the Christian student. For what can be of profounder interest than to learn what the Jews have said concerning Jesus and Christianity. We naturally look to the Jewish historian Josephus, who described and witnessed the downfall of the Jewish commonwealth. But we are disappointed. True that in his "Antiquities" (XVIII, 3, 3) Josephus has reference to Christ, but scholars are now generally agreed[1] that this passage is a later interpolation. Leaving then aside Josephus, we must turn to that encyclopedia of "Jewish wisdom and unwisdom" which is known as the Talmud. We cannot speak here of the origin and contents of this voluminous work, of which a complete translation into any modern language does not yet exist. We must refer the reader to our article "Talmud."[2] But even this work does not add anything to our knowledge, yea, it is rather disappointing. For the Talmud as we now have it contains not those Christian or rather anti-Christian passages, which it originally had. Modern Judaism complains of the intolerance of the Church, which from the time of Justinian[3] persecuted and burned the Talmud. But it forgets that the Talmud only reaped what

[1] See however among other defenders of the passage in Josephus, Seitz, *Christus-Zeugnisse aus dem klassischen Altertum*, Cologne, 1906, 9 et. seq.

[2] See McClintock & Strong's *Theol. Enc.*, vol. X (1881) *s. v.* "Talmud."

[3] On February 13, 553 he issued a novella "concerning the Jews."

it has sowed, and that the Church of Rome only acted in accordance with the Talmud itself. For it was the very Talmud which taught that in case of a fire breaking out on the Sabbath, the Gospels and other works of the *minim* (i. e., Christians) should not be rescued. "By the life of my son," said the Rabbi Tarphon, "should they (i. e., these writings) come into my hand I would burn them together with the names of God which they contained. Were I pursued, I would rather take refuge in a temple of idols than in their (i. e., the Christians') houses. For the latter are wilful traitors, while the heathen sinned in ignorance of the right way; and concerning them the Scripture says: 'Behind the doors, also, and the posts, hast thou set up thy remembrance'" (Is. lvii. 8).[4] This fact should not be forgotten. The anti-Christian character of Jewish writings early attracted the attention of Christians, and Agobard, bishop of Lyons (820-830) in his *De Judaicis Superstitionibus*, and Hrabanus Maurus, archbishop of Mayence, in his *Contra Judaeos*, written about 847 A. D., betray acquaintance with Jewish literature. The first attack upon the Talmud was made in the thirteenth century, when A. D. 1240 a conference was held at Paris betwen Nicolas Donin and some Jewish rabbis. When the question came up as to Jesus in the Talmud, rabbi Jechiel, the most prominent of the Jewish rabbis at that conference, would not admit that the Jesus spoken of in the Talmud was Jesus of Nazareth, but another Jesus, a discovery which was copied by some later writers. But modern Jews acknowledge the failure of this argument, for says Dr. Levin in his prize essay: "We must regard the attempt of rabbi Jechiel to ascertain that there were two by the name of Jesus as unfortunate, original as the idea may be."[5] As the author of

[4] Talmud, *Shabbath*, fol. 116, col. 1. This his animosity against Christianity induced some scholars to maintain that this Rabbi Tarphon is the same Trypho who is the interlocutor in Justin Martyr's *Dialogue*.

[5] "Die Religionsdisputation des Rabbi Jechiel von Paris," published in Graetz's *Monatsschrift*, Breslau, 1869, p. 193.

this essay was a pupil of the rabbinical seminary at Breslau, he certainly expressed the opinion of his teachers. The result of the conference was that the Talmud in wagon-loads was burned at Paris in 1242.

In our days, such accusations against the Talmud were impossible, because all these offensive passages have been removed—not so much by the hands of the Christian censor, as by the Jews themselves—a fact only very often overlooked by controversialists.—In the Jewish year 5391 (i. e., A. D. 1631) a Jewish synod held at Petrikau, in Poland, issued a circular letter[6] to the effect that all such passages in the Talmud which refer to Jesus etc., should be omitted in the future. This letter explains the absence of those offensive passages from the editions of the Talmud published since the publication of the Amsterdam edition in 1644. But happily or unhappily the Jews themselves have taken care that "the expurgated passages in the Talmud" did not become lost to their coreligionists by publishing them anonymously in pamphlets, of which Professor Strack of Berlin mentions no less than four such editions.[7] These collections, published for the most part in Germany, are of a recent date, and are probably intended for more than a mere literary interest.

In order to give back to the Jews what the censor has taken from them and to show them that Christianity has nothing to fear from these expurgated passages, Professor Dalman of Leipsic, one of the few Christian scholars who are entitled to be heard even in *Talmudicis,* has published in a convenient form all these passages contained in the oldest editions of the Talmud and Midrash. To this collection of the censured passages H. Laible appended an introductory essay, and the whole was published under the

[6] The reader can find this circular letter in my article "Talmud" in McClintock & Strong's *Theol. Enc.*, vol. x, p. 172.

[7] The present writer has also one of these collections, published at Cracow, 1893.

title *Jesus Christus im Talmud*, Berlin, 1891, by the missionary "Institutum Judaicum."

Before we enter into the debating club of the rabbis, we will make a few preliminary remarks which can prepare us for the Talmudic statements.

During the life-time of Jesus his miracles were not denied but were traced back to Beelzebub, the prince of the devils (Mark iii. 22). The scribes would not recognize one who sought not their company, but that of publicans and sinners with whom he ate; who broke the Sabbath and abolished the difference between clean and unclean. That the grave of Christ had been empty, the Jews did not deny, but they thought that the disciples had stolen the body (Matt. xxviii. 15). They freely made use of the invective Beelzebub ("master of the house") for the "master" of the Christians as well as for his servants (Matt. x. 25). After his death, the crucified Messiah, as Paul tells us, became unto them a stumbling block (1 Cor. i. 23). The destruction of Jerusalem had made no impression upon "these villains" and upon "that ungodly generation," as Josephus calls his countrymen (*War*, v, 13, 6). But if the sword of Judaism was perforce sheathed, its tongues and pens were active. The apologetic writings of the earliest centuries, show that the Jews were busy throughout this whole era in circulating calumnies against the Christians. Justin Martyr (died 163 A. D.) complains of the Jewish blasphemies against Christ and the Christians. "The high priests of your nation and your teachers," he says, "have caused that the name of Jesus should be profaned and reviled through the whole world" (*Dialogue with Trypho*, 117). "Nay, ye have added thereto, that Christ taught those impious, unlawful, horrible actions, which ye disseminate as charges above all against those who acknowledge Christ as Teacher and as the Son of God" (*ibid.* 108). "Your teachers exhort you to permit

yourselves no conversation whatever with us" (*ibid.* 112). "The Jews regard us as foes and opponents, and kill, and torture us if they have the power. In the lately-ended Jewish war, Bar Kokh'ba, the instigator of the Jewish revolt, caused Christians alone to be dragged to terrible tortures, whenever they would not deny and revile Jesus Christ" (*Apology*, I, 31). "The Jews hate us, because we say that Christ is already come, and because we point out that He, as had been prophesied, was crucified by them" (*Dial.* 35). "Ye have killed the Just and His prophets before Him. And now ye despise those who hope in Him and in God, the King over all and Creator of all things, who has sent Jesus; ye despise and dishonor them, as much as in you lies, in that in your synagogues ye curse those who believe in Christ. Ye only lack the power, on account of those who hold the reins of government, to treat us with violence. But as often as ye have had this power, ye have also done this" (*ibid.* 16). "In your synagogues ye curse all who have become Christians, and the same is done by the other nations, who give a practical turn to the curse, in that when any one acknowledges himself a Christian, they put him to death" (*ibid.* 96).

From the "True Word" of Celsus, which has been answered by Origen, we already learn some of the mean things which the Jews circulated about Jesus. The Jew whom Celsus introduces charges Jesus with having falsely proclaimed himself to be born of a virgin; afterwards he says that Jesus was born in a poor Jewish village, and that his mother was a poor woman of the country, who supported herself with spinning and needlework; that she was cast off by her betrothed, a carpenter; and that after she was rejected by her husband, she wandered about in disgrace and misery till she secretly gave birth to Jesus. Jesus himself was obliged from poverty and necessity to go down as servant into Egypt, where he learnt some of the

secret sciences which are in high honor among the Egyptians; and he placed such confidence in these sciences that on his return to his native land he gave himself out to be a god (I, 28). The Jew of Celsus also declares that the carpenter who was betrothed to Mary, put the mother of Jesus from him, because she had broken faith with him, in favor of a soldier named Panthera (I, 32).

Tertullian writing somewhere about 197-198 A. D. in his *De Spectaculis*, chap. 30, in which he depicts the glorious spectacle of the second coming says that he will turn to the Jews who raged against the Lord and say unto them: "This is your carpenter's son, your harlot's son; your sabbath-breaker, your Samaritan, your demon-possessed! This is He whom ye bought from Judas; this is He who was struck with reeds and fists, dishonored with spittle, and given a draught of gall and vinegar! This is He whom His disciples have stolen secretly, that it may be said He has risen, or the gardener abstracted that his lettuces might not be damaged by the crowds of visitors!"

Such is already the attitude of Judaism towards Jesus at a time when the Talmud was in a state of formation. But if we wish to become acquainted with the Rabbinical Jesus-tradition we must examine the constituent parts of the Talmud, namely the Mishna, Tosephta (i. e., addition or supplement to the Mishna), the Gemara or commentary on the Mishna, and the Midrashim or homiletic literature, especially the Midrash Kohelet or Midrash on Ecclesiastes. The Talmudic Jesus traditions continued themselves even after the time of the completion of the Talmud. They were further developed and enlarged, and reached their full expression in the Middle Ages. In that period the hatred of Jesus which was never quite dormant, begat a literature, in comparison with which the Talmud must be termed almost innocent. The Toldoth Jeshu literature originated, which is still continued. In the Toldoth Jeshu a detailed

picture of the life of Jesus was put together, of which the authors of the Talmud had no anticipation. The three consonants *j s* (*shin*) *v*, with which the name Jeshu was written, are here explained as being the first letters of the three words: *j* = *jimmach*, *sh* = *sh'mo*, *v* = *v'zichro*, i. e., "may be blotted out his name and his memory"! The Toldoth Jeshu is nothing but the offspring of low fanaticism, malicious delight in defamation, and vulgar imagination which respectable Jews have always despised.

After these preliminaries we now take up the passages of the Talmud as given by Dalman, and which are claimed to refer to Jesus. For the sake of convenience we arrange them under different heads.

BIRTH AND PARENTAGE OF JESUS.

In the Talmud Shabbath 104*b* we read: "He who cuts upon his flesh." It is a tradition that Rabbi Eliezer said to the wise, Has not Ben Stada brought magic spells from Egypt in a cut which was upon his body? They answered him, He was a fool, and we do not take proofs from fools. [Ben Stada is Ben Pandira. Rab Hisda said, The husband was Stada, the paramour was Pandira. The husband was Paphos ben Jehudah, the mother was Stada. The mother was Miriam the dresser of women's hair, as we say in Pumbeditha, Such a one has been false to her husband.][1]

The above passage occurs in a discussion upon the words in the Mishnah which forbid all kinds of writing to be done on the Sabbath. Several kinds are specified, and among them the making of marks upon the flesh. The words at the beginning of the translation, "he who cuts upon his flesh," are the text, so to speak, of the Mishnah which is discussed in what follows. To illustrate the prac-

[1] The passage in [] which also occurs in Sanhedrin 67*a*, is not found in modern editions. It is supplied from Rabbinowicz Diqduqé Sopherim, on the authority of the Munich and Oxford manuscripts, and the older editions.

tice of making marks on the skin, the compilers of the Gemara introduce a tradition, according to which Rabbi Eliezer asked the question, "Did not Ben Stada bring magical spells from Egypt in a cut which was upon his body?" His argument was that as Ben Stada had done this, the practice might be allowable. The answer was that Ben Stada was a fool, and his case proved nothing. Upon the mention however of Ben Stada, a note is added to explain who that person was, and it is for the sake of this note that the passage is quoted.

The two names Ben Stada and Ben Pandera evidently refer to the same person, and that that person is Jesus is shown clearly by the fact that we sometimes meet with the full name "Jeshu son of Pandera," also Jeshu son of Stada." It seems that the question was argued in the schools which of the two familiar designations (son of Stada, son of Pandera) was the correct one. One of the two appellations appeared to be necessarily false. Which was correct?

The subject treated was that the son of Stada had brought charms with him out of Egypt in an incision in his flesh. Thereupon some one objects: the designation Ben Stada is false; he was the son of Pandera. No, says Rab Hisda (a Babylonian teacher, A. D. 217-309), Stada was the name of the husband (of his mother), Pandira the name of her paramour. To call him either the one or the other is therefore correct. To this however is objected that this cannot be true, because the husband is known to have been called Paphos ben Jehudah. Stada must have been not the father but the mother. But how can that be, because the mother was called Miriam the dresser of women's hair? As rejoinder to this follows the conclusion: Of that we are aware, but she is also called Stada, by her nickname. Insomuch as she had a paramour, she was given the "sobriquet" Stada, which consists of the words *stath da*, i. e., she has gone aside, from her husband. Thus

at least the word is explained in the Babylonian Academy at Pumbeditha.

Various attempts have been made to explain the two names Ben Stada and Ben Pandira (also written Pandera, or Pantira). But none of the suggested explanations solves the problem. We leave the two names as relics of ancient Jewish mockery against Jesus, the clue to whose meaning is now lost.

Mention has also been made of Miriam (of which Mary is the equivalent). She is called *m'gaddla nashaia*, i. e., a women's hairdresser. How came the Talmud to bestow this epithet upon the mother of Jesus, for whom elsewhere it has the characteristic designation of adulteress? That Jesus's mother was named Mary, was known to the Jews; that she had born Jesus out of wedlock, was maintained by them. Then they heard a noted Christian woman of Jesus's time often spoken of, who was named Mary of Magdala. What was more natural for those who had already long ceased to ascertain more particularly at the mouth of Christians the history of Jesus, than by this Mary (of) Magdala simply to understand Jesus's mother, especially since their knowledge was confined to one Mary? She was reported to be a great sinner. This harmonized in a twofold way with their assumption, for, that Jesus's mother was a sinner, was maintained by them with the utmost certainty, and now they obtained, as they supposed, actual confirmation of this from the Christians. Miriam (of) Magdala was accordingly the mother of Jesus, and by a name-play the Magdala was turned into *m'gaddla nashaia*, i. e., women's hairdresser.

In the Talmudic passage quoted above we are told that Stada's (i. e., Mary's) lawful husband was Paphos ben Jehudah. Now of this Paphos, who lived a century after Jesus, the Talmud Gittin 90[a] narrates the following:

"There is a tradition, Rabbi Meir used to say: 'Just as

there are various kinds of taste as regards eating, so there are also various dispositions as regards women. There is a man into whose cup a fly falls and he casts it out, but all the same he does not drink it [the cup]. Such was the manner of Paphos ben Jehudah, who used to lock the door upon his wife, and go out.' "

All we learn from this passage directly with regard to Paphos ben Jehudah, a contemporary of Rabbi Akiba, is that he locked up his wife; we are, however, led to conclude, indirectly, that she ultimately proved unfaithful to her tyrannical spouse. What, then, was more simple than for a story-teller to connect this with the details of unfaithfulness found in his Jeshu repertoire? The erring wife was just like Miriam; before long she actually became Miriam, and finally Paphos ben Jehudah was confidently given as Miriam's husband! So they had it in later times, and the great Talmudic commentator Rashi (died A. D. 1105) comments thus upon our passage: "Paphos ben Jehudah was the husband of Mary, the women's hairdresser. Whenever he went out of his house into the street, he locked the door upon her, that no one might be able to speak with her. And that is a course which became him not; for on this account there arose enmity between them, and she in wantonness broke her faith with her husband."

A MARY-LEGEND.

In Talmud Hagigah 4^b we read the following: "When Rab Joseph came to this verse (Prov. xiii. 23), 'But there is that is destroyed without judgment,' he wept. He said: 'Is there really some one who is going [away], when it is not his time?' None but this [told] of Rab Bibi bar Abbai. The Angel of Death was with him. The Angel said to his messenger, 'Go, bring me Miriam the dresser of women's hair.' He brought him Miriam the teacher of chil-

dren. He [the Angel] said, 'I told thee Miriam the dresser of women's hair.' He said, 'If so, I will take this one back.' He said, 'Since thou has brought this one, let her be among the number [of the dead].' "

In this narrative we have a monstrous anachronism. Rab Joseph, who is mentioned here, was born at Shiti, in Babylonia, A. D. 259 and died in 325. Rab Bibi flourished in the fourth century. The latter can neither have seen Mary nor have been her contemporary. The Talmudic commentary Tosaphoth remarks: "The Angel of Death was with him: he related what had already happened, for this about Miriam the dresser of women's hair took place in [the time of] the second temple, for she was the mother of that *so and so* [i. e., Jesus], as it is said in Shabbath 104^b." But the wording of the Talmud says quite distinctly that Mary lived in the very time of Rab Bibi, on which account the Angel of Death spoke with him not of one who had existed earlier, but of one actually living. Further this angel, we may note, at that very time in the presence of Rab Bibi commissions his messenger, to bring her, i. e., deliver her to death. The Tosaphoth notes on Shabbath 104^b seek needlessly to remove the anachronism by the assumption that there were two women's hairdressers, named Mary. But this attempt is in vain, for nothing is known of that second Mary. Besides we must not forget that the Talmud, in relation to Jesus, has no conception of chronology, and indeed, the later the origin of notices about Jesus, the more reckless are they in their chronological lapses. The post-Talmudic Second Targum on the Book of Esther actually reckons Jesus among the ancestors of Haman, an anachronism, which Levy in his Targumic dictionary (I, 330) seeks in vain to justify. In the face of such an unfathomable error what signifies the erroneous representation that Rab Bibi lived in the time of Mary?

JESUS ALLEGED TO BE BORN OUT OF WEDLOCK.

1. *The Pretended Record.*

It is said in Mishnah Jebamoth iv, 13[2] (Gemara 49[b]): "Simeon ben Azai said, 'I have found in Jerusalem a book of genealogies, and therein is written: That *so and so*[3] is a *mamzer*[4] of a married woman, to confirm the words of Rabbi Jehoshua.'"

This passage is from the Mishnah, and therefore belongs to the older stratum of the Talmud. Ben Azai flourished at the end of the first and the beginning of the second century, and was a friend and contemporary of Rabbi Akiba who was a particularly zealous opponent of the Christians. When Ben Azai reported that he had found a book of pedigrees, in which it was stated that *so and so* (peloni) was of spurious birth, it is certainly probable that reference is to Jesus. Unless some well-known man were intended, there would no point in referring to him; and unless there had been some strong reason for avoiding his name, the name would have been given in order to strengthen the argument founded upon the case. For it is said that Ben Azai made his statement in order "to confirm the words of Rabbi Joshua." The matter in question concerned the definition of the notion of *mamzer*, a predicate which the Jews only too willingly ascribed to Jesus. That the passage refers to Jesus is admitted by the Jewish scholar J. Derenbourg (in *Revue des Etudes Juives*, III, 293, n. 3).

[2] It is interesting that the English translators of the Eighteen Treatises of the Mishna, rabbis De Sola and Raphall (London, 1845) have not translated this part of the fourth chapter. Why?

[3] The original reads *peloni*, and is one of the twenty-eight periphrastic titles of Jesus from Jewish writings, adduced by Eisenmenger in the second chapter of the first part of his *Entdecktes Judenthum*.

[4] I. e., a bastard, a predicate attributed by the Jews to Jesus.

THE ALLEGED CONFESSION BY THE MOTHER OF JESUS.

In the treatise Kallah 18^b we read the folowing: "A shameless person is according to Rabbi Eliezer a bastard, according to Rabbi Joshua a son of woman in her separation, according to Rabbi Akiba a bastard *and* son of a woman in her separation. Once there sat elders at the gate when two boys passed by; one had his head covered, the other bare. Of him who had his head uncovered Rabbi Eliezer said, 'a bastard!' Rabbi Joshua said, 'A son of a woman in her separation!' Rabbi Akiba said, 'A bastard *and* son of a woman in her separation!' They said to Rabbi Akiba, 'How has thine heart impelled thee to the audacity of contradicting the words of thy colleagues?' He said to them, 'I am about to prove it.' Thereupon he went to the boy's mother, and found her sitting in the market and selling pulse. He said to her, 'My daughter, if thou tellest me the thing which I ask thee, I will bring thee to eternal life.' She said to him, 'Swear it to me!' Thereupon Rabbi Akiba took the oath with his lips, while he canceled it in his heart. Then said he to her, 'Of what sort is this thy son?' She said to him, 'When I betook myself to the bridal chamber, I was in my separation, and my husband stayed away from me. But my paranymph [i. e., the bridegroom's best man] came to me, and by him I have this son.' So the boy was discovered to be both a bastard and the son of a woman in her separation. Thereupon said they, 'Great is Rabbi Akiba, in that he has put to shame his teachers.' In the same hour they said, 'Blessed be the Lord God of Israel, who has revealed this secret to Rabbi Akiba ben Joseph.'"

This famous discussion on bastardy, even when taken by itself is remarkable from the ethical point of view. Considering the strange ascription of an act of heartless perjury to Akiba as the means whereby he extorted the con-

fession from the boy's mother, and the far more curious addition at the end of the passage which blesses the God of Israel for revealing "this secret" after the use of such questionable means, we ask: Can modern Jews still uphold the reputation of the Talmud or of its great authority, Akiba?

Considering the passage by itself, we see that neither the name of the son nor that of the mother is here mentioned. But the fact that use has been made of the story in the *Toldoth Jeshu* (ed. Hulreich, p. 22; ed. Wagenseil, p. 12; MS. Strassburg, ed. Krauss,[5] p. 39; MS. Vindobona, *ibid.*, p. 69) shows that it was regarded as having reference to Jesus. That Akiba lived about a century after Jesus, is of no account, since the Talmud abounds in anachronisms.

JESUS AND HIS TEACHER.

Whereas the New Testament knows nothing of Jesus having enjoyed the tuition of a rabbi, the Talmud *Sanhedrin*, 107*b* (and almost exactly in the same words *Sota*, 47*a*) narrates the following: "Our Rabbis teach, Ever let the left hand repel and the right hand invite, not like Elisha who repulsed Gehazi with both hands, and not like Rabbi Joshua ben Perachjah who repulsed Jeshu (the Nazarene) with both hands. What of Rabbi Joshua ben Perachjah? When Jannai the king killed our Rabbis, Joshua ben Perachjah [and Jeshu] fled to Alexandria in Egypt. When there was peace, Simon ben Shetach wrote to him: 'From me [Jerusalem] the city of holiness, to thee Alexandria of Egypt [my sister]. My husband stays in thy midst and I sit forsaken.' He came and found himself at a certain inn; they showed him great honor. He said, 'How beautiful is this Ascania!'[6] [Jesus] said to him, 'Rabbi,

[5] *Das Leben Jesu nach jüdischen Quellen*, Berlin, 1902.

[6] The word means both inn and innkeeper. Joshua uses it in the first sense, the answering remark implies the second meaning "hostess."

she has narrow eyes.' He said, 'Wretch, dost thou employ thyself thus?' He sent out 400 trumpets and excommunicated him. He [Jesus] came before him many times and said to him, 'Receive me.' But he would not notice him. One day he [i. e., Joshua] was reciting the Shema (i. e., the words: 'Hear, O Israel,' Deut. vi. 4 et seq.), he [i. e., Jesus] came before him. He was minded to receive him, and made a sign to him. He [i. e., Jesus] thought that he repelled him. He went and hung up a tile and worshiped it. Joshua said to him, 'Return.' He replied, 'Thus I have received from thee, that every one who sins and causes the multitude to sin, they give him not the chance to repent.' And the teacher [i. e., he who has handed down this tradition] has said, 'Jesus the Nazarene practiced magic and led astray and deceived Israel.'"[7]

In the Jerusalem Talmud *Hagigah, 77d,* the same story is related only that in place of Joshua ben Perachjah his contemporary Judah ben Tabbai is placed and that the name of Jesus is not mentioned, for which we read "one of his (Tabbai's) disciples." But whether the reading is Joshua ben Perachjah or Judah ben Tabbai we have here again one of those striking anachronisms for which the Talmud is famous. The event under King Jannai (i. e., Alexander Jannaeus) is historical. After the capture of the stronghold Bethome King Jannai (104-78 B. C.) had 800 Pharisees crucified. This crucifixion was the occasion of the flight into Syria and Egypt on the part of the Pharisees generally in the country, and among them Joshua ben Perachjah and Judah ben Tabbai. The question may be asked, how did the name of Jesus[8] come to be introduced into a story referring to a time so long before his own?

[7] This formal charge is also found in *Sanhedrin 43a,* where the words of "the teacher" are found.

[8] In the edition of Basel, 1578-81, and in all later ones, the censor of the press has expunged the name of Jesus, which is found in all the older editions of the Talmud.

Bearing in mind that the rabbis had extremely vague ideas of the chronology of past times, we may perhaps find the origin of the story in its Babylonian form in a desire to explain the connection of Jesus with Egypt. The connecting link may, perhaps, be found in the fact of a flight into Egypt to escape the anger of a king. This was known in regard to Joshua ben Perachjah, and the Gospel (Matt. ii. 13 et seq.) records a similar event in regard to Jesus. There may be some other details in the life of Jesus which the rabbis had in view when they remodeled the story to suit their purpose. Hence, in rejecting the date, it is not absolutely necessary to reject the whole of the Babylonian version as entirely devoid of every element of genuineness. Again, as to the lateness of the Babylonian version, it is to be observed that the Gemara quotes from an earlier source or tradition of the story, as can be seen from the closing words of the Talmud passage (*Sanhedrin* 107*b*) given above.

JESUS A MAGICIAN.

Whereas the Toldoth Jeshu attributes the miraculous power of Jesus to the Shem (i. e., the Tetragrammaton or Ineffable Name) which he stole from the Temple at Jerusalem by a strange device, the Talmud knows nothing of this robbing of the Shem from the Temple, but records that Jesus brought magic out of Egypt.[9] The passages referring to it are:

1. Tosephta[10] Shabbath XII: "He who upon the Sabbath cuts letters upon his body is, according to the view of Rabbi Eliezer guilty, according to the view of the sages he is not guilty. Rabbi Eliezer said to the sages: 'Ben Stada surely learned sorcery by such writing.' They re-

[9] Egypt was regarded as the special home of magic, an opinion expressed in the Talmud Kiddushin 49*b*: "Ten measures of sorcery descended into the world, Egypt received nine, the rest of the world one."

[10] That is "supplement to the Mishna"; best edition by Zuckermandel, (Pasewalk, 1880), p. 126.

man shall say to thee, 'I am God,' he lies; if he says, 'I am the son of man,' he shall rue it; 'I will go up to heaven' (to this applies Num. xxiii. 19) he saith, but shall not perform it."

That the passage refers to Jesus there can be no possibility of doubt. This Rabbi Abahu, who lived in Cæsarea at the end of the third and the beginning of the fourth century, seems to have largely engaged in controversy with Jewish Christians. According to Abahu any one who says that he is God and at the same time designates himself as Son of Man—and this no man save Jesus has ever done —is a liar.

The import of the testimony of Jesus to Himself is mentioned also in the Midrash Pesikta Rabbathi (ed. Friedmann, 1880), fol. 100*b*: "Rabbi Hia bar Abba [about 216 A. D.] said: 'If the son of the harlot shall say to thee, There be two Gods, answer him, I am He of the sea, I am He of Sinai.' Rabbi Hia bar Abba said, 'If the son of the harlot shall say to thee, There be two Gods, answer him, It is here (Deut. v. 4) written not *Gods* but *the Lord* hath spoken with you face to face.'"

That God has a son, and that for this reason there are two Gods, passes here for the teaching of the harlot's son, wherein the reference is clear, namely to Jesus.

An amplification of Abahu's work, given above, is found in the Midrash Jalqut Shimoni (also Midrash Jelammedenu) on Num. xxiii. 7, where we read that Rabbi Eleazar ha-Qappar said that "God gave strength to his (Balaam's) voice, so that it went from one end of the world to the other, because he looked forth and beheld the peoples that bow down to the sun and moon and stars, and to wood and stone, and he looked forth and beheld that there was a man, son of a woman, who should rise up and seek to make himself God, and to cause the whole world to go astray. Therefore God gave power to his

JESUS AN IDOLATER.

Jesus is not only a fool but also an idolater. In the Talmud Sanhedrin 103*a* we read on the passage Ps. xci. 10, "There shall no evil befall thee," that it means that evil dreams and bad fantasies shall not vex thee; on "Neither shall any plague come nigh thy tent," that it means that thou shalt not have a son or disciple who burns his food publicly like Jeshu (i. e., Jesus) the Nazarene.[11]

The last clause is also found in Talmud Berachoth 17*b*. The authority who quotes this passage is Rabbi Hisda, a Babylonian who lived A. D. 217-309. He quotes it in the name of Rabbi Jeremiah bar Abba, who was his contemporary, and apparently of about the same age. As to the term "to burn his food publicly," lexicographers are of different opinions. Dalman says that this means "to renounce publicly what one has learned." Laible thinks that the term is "a contemptuous expression for the public offering of sacrifice to idols. That the Christians in their assemblies offered sacrifice to idols was as firmly the opinion of the Jews of olden time as it is that of many of the present day. Naturally, therefore, it was concluded that Jesus must have commenced it." May be it refers to the fact that Jesus went and taught the people publicly—the poor, the outcast, the oppressed, the sinners, the publicans, in a word the unpurified people, with whom a disciple of a rabbi ought not to associate. But whatever the meaning, certain it is that in the eyes of the rabbis Jesus was a heterodox, who according to Talmud Sanhedrin 43*a* and 107*b* "corrupted and seduced Israel."

THE CLAIM OF JESUS DENIED.

In the Jerusalem Talmud Taanith 65*b* we read with reference to Num. xxiii. 19: "Rabbi Abahu said, If a

[11] So in all the older editions and the manuscripts.

ened by the fact that the preceding paragraph of the Mishna (x, 1)in this chapter excepts from the privilege of the world to come according to Rabbi Akiba also such a person "who reads in external books and who whispers over a wound, and says, None of the diseases which I sent in Egypt will I lay upon thee, I the Lord am thy healer." Now the external books, according to the Gemara upon this passage (fol. 100*b*) are the *Siphre Minim,* i. e., the books of the Jewish Christians or Christians generally, which books by way of caricature Rabbi Meïr (130-160 A. D.) calls *awen gillayon* (literally, margin of evil) and Rabbi Jochanan (Meïr's contemporary) calls *awon gillayon* (i. e., blank paper of sin)—thus in Talmud Shabbath 116*a* (MS. Munich).

The words "who whispers over a wound," refer to the miraculous cures of the Christians.

The combination of Balaam with Doeg, Ahitophel and Gehazi is certainly extraordinary. Balaam was not an Israelite, and therefore could not logically be included in a list of exceptions to a rule which only affected Israelites. It is evident that Balaam here does not mean the ancient prophet of Num. xxii et seq., but some one else for whom that ancient prophet could serve as a type. From the Jewish point of view there was considerable likeness between Balaam and Jesus. Both had led the people astray; and if the former had tempted them to gross immorality, the latter, according to the Rabbis, had tempted them to gross apostasy. This was the great charge against Jesus, that "he practised magic and deceived and led astray Israel." If it be true that Balaam stands for Jesus, then it is reasonable to suppose that Doeg, Ahitophel and Gehazi stand for the names of some other persons who had fallen under severe Rabbinical displeasure. Who they were precisely we have now no means of discovering, and the supposition that they refer to Peter, James and John, or Peter,

Judas Iscariot[12] and Paul may be possible. However this may be, the rabbis were convinced that the disciples of Balaam *en bloc* would inherit Gehenna, as we read in Aboth v, 19: "The disciples of our father Abraham enjoy this world and inherit the world to come, as it is written (Prov. viii. 21) 'That I may cause those that love me to inherit substance, and that I may fill their treasuries.' The disciples of Balaam the impious inherit Gehenna and go down into the pit of destruction, as it is written (Ps. lv. 24): 'But thou, O God, shalt bring them down into the pit of destruction; bloodthirsty and deceitful men shall not live out half their days:' "

And if there should by any chance be still the slightest hesitation in the mind of the reader that Balaam in these passages is identical with Jesus, the following passage should forever set his mind at rest.

THE AGE OF BALAAM (JESUS).

In the Babylonian Talmud Sanhedrin 106*b* we read thus: "A certain heretic (*min*) said to Rabbi Hanina, 'Have you ever heard how old Balaam was?' He replied, 'There is nothing written about it. But since it is said, Bloodthirsty and deceitful men shall not live out half their days (Ps. lv. 23), he was either thirty-three or thirty-four years old.' He (the heretic) said, 'Thou hast spoken well. I have seen the chronicle of Balaam in which it is said, Balaam, the lame, was thirty-three years old when the robber Phinchas killed him.' "

Rabbi Hanina lived at Sepphoris and died 232 A. D. There seems to be no apparent reason why a Christian (a *min*) should have asked him as to the age of the ancient Balaam. He might well have inquired about the age of Jesus. It would seem, however, that the Christian was

[12] Judas Iscariot would answer to Doeg the Edomite, who betrayed David (1 Sam.xxii. 9).

not asking for information, but had a desire to find out whether the rabbi knew anything about Jesus. For he confirmed the rabbi's answer by facts known to himself. The "Chronicle of Balaam" probably denotes a Gospel, though none of the known Gospels states in so many words that Jesus was as much as thirty-three years old. If, however, it was believed that his ministry lasted three years, and that he was "about thirty years old" when he began to preach, the statement of the Christian is sufficiently borne out, though not verbally correct. Rabbi Hanina must have had fairly good grounds for his opinion as to the age of Jesus, or he would not have quoted a text which would only apply to the case of a man about thirty-three or thirty-four years old.

As to Phinchas the robber or "Pinchas Listāāh" who is said to have killed Balaam, it is difficult to understand why this worthy, who is mentioned in Num. xxv. 23 et seq. as having led an army against the Midianites and slain their kings together with Balaam with the sword, and this at Moses's command, should be called "the robber." Some Jewish writers see in Pinchas Listāāh a corruption of Pontius Pilate. The corruption, we admit, is a somewhat violent one; but that a Jew should call Phinchas a robber, being, as he was, a highly honored hero of tradition, must certainly be surprising. There is no doubt that under this mention of Pinchas Listāāh there lies concealed a reference to Pontius Pilate.

THE TRIAL OF JESUS.

1. In the Mishna Sanhedrin X, 11, we read: "In regard to all who are worthy of death according to the Torah, they do not use concealment against them, except in the case of the deceiver. How do they deal with him? They
two disciples of the wise in the inner chamber, and he
n the outer chamber, and they light the lamp so that

they shall see him and hear his voice. And thus they did to Ben Stada in Lud; two disciples of the wise were chosen for him, and they (brought him to the court of justice) and stoned him."

2. In the Jerusalem Recension VII, 16 (fol. 25*c*, *d*) we read: "The deceiver; this denotes a private man. Not a sage? No. From the time he deceives he is no longer a sage. And from the time he is deceived he is no longer a sage. How do they deal with him to work craftily against him? They conceal (in his case) two witnesses in the inner chamber and make him sit in the outer chamber, and they light a lamp over him that they may see him and may hear his voice. Thus did they to Ben Stada in Lud, and they concealed in his case two disciples of the wise, and brought him to the court of justice and stoned him.

3. The Babylonian Gemara Sanhedrin 67*a* has the following version of this incident: "For it is a tradition that in regard to the rest of all who are worthy of death according to the law, they do not use concealment except in this case (i. e., of the deceiver). How do they deal with him? They light a lamp for him in the inner chamber and set witnesses in the outer chamber, so that they may see him and hear his voice, but he does not see them. And one says to him, 'Say to me what thou saidst to me in private.' and he says it to him. And another says to him, 'How shall we forsake our God who is in heaven, and practice false worship?' If he repents, it is well. If he says, 'Such is our duty and thus it becomes us to do,' the witnesses who hear him from outside, bring him to the court of justice and stone him. And thus they did to Ben Stada in Lud, and they hung him on the eve of the Passover."

That the case described in these passages refers to Jesus (called Ben Stada), who was also charged with deceiving

the people, is clear. It is also clear that at an early period there was a tradition that the condemnation of Jesus had been obtained by the fraudulent means described above. There can be no doubt that in these passages we have here only scanty remnants of a tradition about that trial, combined perhaps with hearsay information derived from Christians. Renan in his *Life of Jesus* (chap. 24) believes that the New Testament account of the Trial of Jesus must be supplemented by these Talmudic notices. But an equally good, if not better authority, Keim (*Jesus of Nazara* VI, 47n.) says that there is no ground for correcting the Gospel account by the help of the Talmud. Rather it is the Gospel account which throws light upon the Talmudic tradition. From the Gospel story are derived the two witnesses (Matt. xxvi. 60. In Mark xiv. 56, 57, several witnessed are mentioned). The Gospel speaks of "false" witnesses, and this is perhaps the origin of the Talmudic assertion that the witnesses were concealed in order to entrap the accused. The mention of the outer and inner chamber recalls Matt. xxvi. 69, where it is said that "Peter was sitting without in the court" while the trial was going on within the house of the High Priest. The lighted lamp may have been suggested by the mention of the fire kindled in the outer court (Luke xxii. 55). And finally the statement that the accused was carried to the court of justice, may have its origin in the fact that there was, according to the Gospels, a second sitting of the council after the one at which the witnesses had been present (Mark xv. 1). The Talmudic tradition differs from the Gospel in saying that the trial took place at Lud (Lydda), and that Jesus was hung on the eve of the Passover. Of this we shall speak further on. But all tends to show that the Talmud has preserved only a very vague and confused recollection of Jesus, whose name was doubtless held in abhorrence as that of a dangerous heretic and deceiver.

THE EXECUTION OF JESUS.

We read Sanhedrin 43*a*: "And it is tradition: On the eve of the Passover they hung Jeshu [the Nazarene]. And the crier went forth before him forty days (saying), '[Jeshu the Nazarene] goeth forth to be stoned, because he hath practiced magic[13] and deceived and led astray Israel. Any one who knoweth aught in his favor, let him come and declare concerning him. And they found naught in his favor. And they hung him on the eve of the Passover. Ulla said, 'Would it be supposed that [Jeshu the Nazarene] a revolutionary, had aught in his favor?' He was a deceiver, and the Merciful (i. e., God) hath said (Deut. xiii. 8), 'Thou shalt not spare, neither shalt thou conceal him.' But it was different with [Jeshu the Nazarene], for he was near to the kingdom."[14]

In this passage we are told that Jesus was hung. With this must be combined the evidence of the passages given in the former section that he was stoned. The connection between the two statements is that Jesus was stoned, and his dead body then hung upon a cross. This is clear from the Mishna Sanhedrin vi, 4: "All who are stoned are hung,

[13] It is certainly strange that Jesus was charged with having practiced magic, whereas magical skill was one of the qualifications necessary for a member of the Sanhedrin. Thus we read in treatise Sanhedrin 17*a*: Rabbi Jochanan says, none were allowed to sit in the Sanhedrin, who were not men of stature, men of wisdom, men of good appearance, aged, skilled in magic, and acquainted with seventy languages, so that the Sanhedrin might not be obliged to hear through an interpreter.—That this statement is in opposition to Deut. xviii. 10-12 makes no difference with the rabbis. The commentary indeed tells us, that this magical skill was acquired in self-defence "in order to kill the magicians who trusted in their magical arts to deliver them out of the hands of the tribunal." But this explanation does not mend the matter. Magic is a thing absolutely unlawful and expressly forbidden by God. But it may well be doubted whether the members of this great council confined their magical exercitations to the killing of magicians. We find elsewhere, that the rabbis at least made other magical experiments, and have even recorded the means which they employed, for the benefit of posterity. We refer to Talmud Berachoth 6*a*, where the people and all Israel are instructed in the means to see demons. The passage being too silly, we refrain from giving it.

[14] The whole of this passage is expunged from the later editions. It is given here on the authority of the MSS. and early editions set forth by Rabbinowicz. The words in [ ] are from MSS.

according to Rabbi Eliezer. The sages say, None is hung except the blasphemer and he who practices a false worship." The corpse was hung to a cross or else to a single beam, of which one end rested on the ground, the other against a wall (same Mishnah). The Gospels, of course, say nothing about a stoning of Jesus, and the Talmudic tradition is probably an inference from the fact that he was known to have been hung. The inference would be further strengthened by the application of the text, Deut. xxi. 23, "He that is hanged is accursed of God," a text which Paul had to disarm in reference to Jesus (Gal. iii. 13). The Talmud knows nothing of an execution of Jesus by the Romans, as modern Jews claim, but makes it wholly the act of the Jews.

What is meant by the herald going forth during forty days before the death of Jesus, is hard to tell. The herald is, of course, fictitious; the number forty may have its origin in the Gospel. The phrase that Jesus was "near to the kingdom," Laible interprets as referring to the "Roman authorities," which would explain the hesitation of Pontius Pilate to put Jesus to death. We rather prefer the suggestion that the reference is to the supposed Davidic descent of Jesus, a suggestion made by the late Professor Delitzsch in his *Jesus and Hillel* (3d ed., 1879) where he says on page 12, note: "Mary is also called in the Talmuds a daughter of Eli, and Jesus is called (Sanhedrin 43*a*) 'related to the royal house (of David).' "

JESUS IN HELL.

In the Talmud Gittin 56*b*, 57*a*, we read: "Onkelos bar Kalonikos, nephew of Titus, desired to become a Jew. He called up Titus by necromancy. He said to him, 'Who is honored in this world?' He replied, 'Israel.' 'What about joining them?' He replied, 'Their words are many and

thou canst not fulfil them. Go, join thyself to them in this world and thou shalt become a leader, for it is written (Lam. i. 5), "Her adversaries have become the head." Every oppressor of Israel is made a head.' He said to him, 'What is thy punishment?' He replied, 'That which I have determined for myself. Every day my ashes are collected and I am judged; then I am burnt and the ashes scattered over seven seas.'

"He called up Balaam by necromancy. He said to him, 'Who is honored in this world?' He replied, 'Israel.' 'What about joining them?' He replied (Deut. xxiii. 6), 'Thou shalt not seek their peace or their prosperity all thy days.' He said to him, 'What is the punishment of this man?' He replied, 'By boiling pollution.'

"He called up Jesus by necromancy. He said to him, 'Who is honored in this world?' He replied, 'Israel.' 'What about joining them?' He replied, 'Seek their good, seek not their harm. Every one who injures them, (it is) as if he injured the apple of his eye.' He said, 'What is the punishment of this man?' He replied, 'By boiling filth.' For a teacher has said, 'Every one who mocks at the words of the wise is punished by boiling filth.' Come and see the difference between the sinners of Israel and the heathen prophets!' "

The object of the gruesome story contained in this passage is to show the fate of the three chief enemies of Israel, i. e., Titus, Balaam and Jesus. And although Jesus is made to regard the Jews as the chosen race, the specially beloved, the apple of Yahveh's eye, yet his punishment seems to be the severest. Whatever that punishment was we know not. At any rate it expresses a hatred towards the most hated of all hated men.

The information which we derive from the Talmudic notices of Jesus is very little if any at all. They add nothing new to the authentic history of Jesus, as contained in

the Gospels. In general, though not in detail, they serve to confirm the Christian tradition, by giving independent, and indeed hostile evidence that Jesus of Nazareth really existed, a fact which has by some been called in question. But if, beyond this, the Talmudic Jesus-tradition has no value for the history of Christianity, it shows the attitude of Judaism as represented by its leaders, towards Jesus. He is the deceiver, the sorcerer, the apostate, the "Sinner of Israel"; his birth Jewish contempt blackened into a disgrace, and his death is dismissed as the mere execution of a pernicious criminal. And thus it is to this day. To understand Jesus and his religion Judaism must divest itself of Rabbinism. Not the Talmud, but the New Testament is the real source for the history of Jesus.

BERNHARD PICK.

NEWARK, N. J.

THE NATURE OF LOGICAL AND MATHEMATICAL THOUGHT.

INTRODUCTORY.

HUMAN thought is dominated by methods based upon a principle which in its various applications is called reason, and the total set of the rules of reason is called logic. In the same way all computations, and further all space-conceptions, measurements of distance and of direction, depend upon a science which has much in common with logic and has received the name "knowledge-lore" or "mathematics."

Experience has shown that the accomplishments of both logic and mathematics are most marvelous. They are the woof of the web in the fabric of all the sciences, and human civilization is their most palpable product. In fact we may say that man himself, especially the scientific thinker, is nothing but reason (viz., logic and mathematics) incarnate. All that distinguishes man from brute creation consists in his ability to think with definite methods, to be logical and exact in measuring and counting.

Now it is strange that the nature of man's rationality is by no means universally recognized. Opinions vary greatly concerning its foundation and its origin, and this divergence has come out most plainly in a new development of mathematical thought which has produced peculiar systems of mathematics differing from the traditional Euclidean system. There is still missing, however, a new

as rigid as are the propositions of Euclid in plane geometry.

To the new-fangled non-Euclideans and to adherents of the New-Science conception this statement may appear antiquated and old-fashioned, but a close inspection will prove that science still stands on the old foundations, and though in the course of modern development new and broader viewpoints have been gained, science will after all be found to remain on the Rock of Ages, on that irrefragable consistency of natural events which can be formulated in the so-called natural laws and finds its noblest development in the rationality of the human mind, viz., in those eternalities which are ultimately nothing but the consistency of thinking, the consistency of doing, the consistency of being. The author has published two books on this most important problem, *Kant's Prolegomena* (being a critical discussion of the Kantian solution) and *The Foundations of Mathematics*; and he wishes here to present a brief recapitulation of his views and add some comments on conceptions which differ from his own.

THE AUTHOR'S POSITION.

The belief in a consistency of existence is first a mere faith, based upon an instinctive apprehension of law underlying all regularities; but this faith proves the more reliable the deeper we penetrate into the nature of being.

A condition of uniformities which admits a possibility of formulating them in natural laws is called in German, *Gesetzmässigkeit*, and this has as yet no equivalent in English. We propose to call it "lawdeterminedness" or simply "lawdom,"* and would define lawdom as a state of things in which all events take place according to general rules,

* The word "lawdom" is formed in analogy to kingdom, freedom, wisdom, Christendom. *Dom* is derived from the same root as *doom*, "judgment," and means in kingdom the dominion of a king; in wisdom, the prevalence of the wise; in freedom, the sway of the free; and in lawdom, it means a condition determined by law.

viz., the laws of nature. In this sense we say that the consistency of natural phenomena manifests itself as law-dom.

Every contradiction is a problem and every solution of a problem becomes a renewed justification of our belief in the consistency of existence. This belief appears for a time as a divine revelation and finally becomes the assured result of science. If there were no consistency there would be no science, reason would be a mere coincidence of haphazard regularities, and a trust in the efficiency of reason should be branded as a vagary of deluded dreamers.

The very existence of reason is an evidence that the universe is consistent throughout, and human reason is an instinctive comprehension of this most remarkable feature of existence, while science is simply the methodical application of reason.

This resumé sounds very simple, yet sometimes it is difficult to state and comprehend simple truths. We shall have to grant that simple truths stand in need of elucidation, for in the infinite manifoldness of actual existence they are rendered quite complex, and thus it happens that great thinkers encounter many difficulties which can be surmounted only by a most scrupulous exactness.

While experience and experiment can not settle the problems as to the nature of mathematical space, we must grant that there is one great truth in the tendency of modern mathematics. It is this, that mathematics is not absolutely independent of experience. Though mathematics is a purely mental construction, the method of its construction is derived from experience. In other words, though mathematics is, in the terminology of Kant, *a priori,* our *modus operandi* is a function which we have procured by abstraction from our activity evinced in the domain of the *a posteriori.* We cancel in thought everything particular which comprises all things concrete, be they of matter or

energy, and retain only our mental faculty of doing something, including a field of action implied by the possibility of moving about. This field of action with its absolute absence of all particularity is characterized by generality. In other words, it is the domain of anyness.

Accordingly we do not start in mathematics with nothing, nor do we go about our business blindly. In arithmetic we operate by taking a step and repeating it again and again. Thus we posit a unit, then we proceed to posit another unit and another, and each unit is the same as all the rest. We count them and operate with their sums. Such is arithmetic or the science of numbers.

When we bear in mind that mathematics is a mental construction we will readily understand that sums in arithmetic are products of synthesis. Every number is the result of an addition, and addition is no mere analysis of the idea of number; it partakes of the synthetic character and becomes possible only through the procedure of positing new units and summing up the total result.

Kant was astonished to find that even the most simple arithmetical calculation (such as $8+5=13$) was not the result of a mere analysis of the numbers implied, but was of a synthetic nature. Analytical judgments do not teach us new truths; they only render the ideas we have clearer and more definite, while synthetic operations increase our stock of knowledge. This puzzled him, for according to his nomenclature all mathematical, arithmetical and logical propositions were *a priori*, and all *a priori* propositions were quite commonly (though erroneously) assumed to be purely analytic. So he came to the conclusion that man's faculty of making *a priori* constructions constituted in itself a source of positive knowledge,—of knowledge that could be increased and amplified without resorting to sense-experience.[1]

[1] I use the term sense-experience on purpose so as to limit the meaning

By *a priori* knowledge Kant understands all that knowledge which is presupposed in experience of any kind. When the chemist analyses some compound and finds in his retorts 87% of its mass, he concludes that he lost 13%; he does not assume that during the process 100 particles have shrunk into 87, or that 13% have vanished into nothing. They are lost to him but have not been annihilated. In the same way all mathematical and logical propositions are relied upon. They are trusted above all experience, and if we make an experiment the result of which contradicts them (or seems to contradict them), we doubt our observations and distrust our experiment. We seek the fault in our notion of the facts in question, not in the principles of reason. We may distrust our calculations and our arguments, but we never doubt the reliability of mathematics and logic. If an astronomer watches a comet, and determines three stations of its course by observation, he can map out a curve which is analogous to its path of motion, and in the same way all the formal sciences furnish us with a key that will unlock to us the mysteries of objective existence. This state of things, the agreement of our purely formal thought-construction with the laws of nature, is a most wonderful coincidence and it puzzled Kant to such an extent as to make of him an idealist, but the problem is solved if we bear in mind the "anyness" which characterizes our purely formal constructions. If consistency dominates both objective existence and our thought, both will be analogous.

How do we produce this anyness?

In geometry we begin with mapping out our field of operation. First we ignore everything actual or concrete; both matter and force are treated as if they were non-existent and all that is left is motility. We can move in

of the term and to avoid the mistake resulting from the looseness of its use in Kantian nomenclature. Cf. the author's *Fundamental Problems*, pp. 26 ff., especially 30.

any direction and everywhere without end. Suppose we spread out in all directions at once by swelling up, or by spreading like light from a source of luminescence, we would cover the entire possibility of our scope of motion. In such a spread of motion we call a path of greatest intensity corresponding to a ray of light a straight line. Now we cut space in two and call the boundary between the two halves a surface. If the cut has been made evenly, which means by a ray and along a ray, i. e., by a straight line, which is a line that follows the path of greatest intensity,[2] we can flop the surface upon itself and we call it "a plane."

As a visible representation of the plane we use a sheet of paper which when folded upon itself produces the straight line. We use the folded sheet as a ruler and operate with it. We lay down units of length (feet and inches, or meters and centimeters) for the sake of measuring lines. Then we draw straight lines in different directions and make them intersect. Their products are angles. We make three lines intersect and call the figure thus created a triangle.

Further on we fold the creased paper upon itself and name the corners right angles. The plane, the straight line, the right angle are boundary conceptions which are useful because they are unique. There are innumerable curves, but only one straight line; there are innumerable obtuse and acute angles, but only one right angle; and thus these boundaries, these products of halving, will serve us as standards of reference.

Our next step is the creation of a curve that by its simplicity would possess the advantage of uniqueness. So, we draw a circle on our doubly folded sheet of paper from the point where the two creases meet. Following historical tradition which can be traced back to the sages of

[2] Compare *Foundations of Mathematics*, pp. 57-58.

ancient Babylon, we divide the whole circle into 360 degrees and we may remember here how their mathematical instinct was guided and influenced by some facts of observation. They rounded off the number of days from 365 to 360,[3] and divided the course of the sun on the ecliptic into twelve mansions of 30 degrees each, corresponding to 12 double hours per day.

The next step in geometrical constructions will be the transfer of angles and the drawing of two straight lines running in the same direction. We call them parallels. When two parallels are crossed by a third straight line, we investigate the nature of the eight angles thus produced.

We continue to operate by setting ourselves a series of tasks, and in doing so we can follow Euclid's propositions in their regular order by dealing with three intersecting lines and then with the circle and other figures. In this way we build up plane geometry without axioms or assumptions through our own operations, and we remain conscious of the method by which we came into possession of the straight line, the right angle, the parallel, etc.

There is nothing actual about our operations. All our achievements are purely mental; they lack concrete reality. There is no matter, no force in our constructions, and yet they are not nothing. The path of our motion is a line, and where two lines cross we have a point. A point is no concrete thing, yet it is not a nonentity; it is a locus in the field of our motion, a spot the position of which is definitely determined on either of the crossed lines. We do not find a plane anywhere in actual life, we construct it; and in the same sense straight lines and right angles are the products of our construction.

[3] The difference was made up every sixth year by the introduction of an intercalary month—the month of the raven, and it is noteworthy that the number 13 as well as the symbol of the thirteenth monh, the raven, have remained omens of ill luck to this day.

Nothing proves so well that our space-conception is in Kant's sense *a priori* as the possibility of non-Euclidean geometries. There is only one rule to guide our operations, consistency, and since particularity of any kind has been banished, the same operation will always and everywhere produce the same result. We operate in an absolutely empty field and our constructions are solely determined by the nature of our operations. All we have to do is to note the consequences of our transactions.

We might have constructed another field for our operations, for instance, the surface of a globe; and if we had done so from the start, our products would have been different. Straight lines would have become impossible and lines analogous to Euclidean straight lines would be largest circles. They are "shortest" or "straightest" lines; not truly straight in the Euclidean sense, they are the straightest lines possible. While two straight lines in the plane never enclose a space, two straightest lines on the sphere always enclose a space; and while the former intersect in one point (or if they are parallel not at all), the latter always intersect at two points and these two points are antipodal.

The construction of spherical geometry is quite simple and it is as easily pictured in visible figures as plane geometry; but there are other geometries possible, less simple and more difficult to describe or to render representable. Each one of them possesses its own characteristics and theoretically considered all of them are equally legitimate. They are all mental constructions. They are all based upon the principle of consistency and obey the general laws of logic, for if they did not recognize consistency, our operations would end in chaos.

The systems of Euclid, of Bolyai, of Lobatchevsky and others, including 4- or n-dimensional manifoldnesses, are *a priori* on the same footing. The difference comes in

when they are applied to practical purposes, and here the Euclideans have after all the advantage. The non-Euclideans make up for it by an enthusiasm as strong as the zeal of religious devotees which on the one hand deserves our admiration while on the other it has a humorous aspect.

That logic and mathematics come from the same root must have been felt by Euclid and his school, for what they call "common notions" are formulations of logical principles, while the description of the characteristics of space are laid down in the definitions and postulates. But the significance of the kinship between these two sciences, it appears, was first felt by Kant who may have been guided in this by his great contemporary Lambert.

Since the time of Kant, both logicians and mathematicians have felt the need of investigating the nature of thought-operations and of broadening the concepts of logic in a similar way as the metageometricians endeavor to construct a pangeometry which would be independent of our conception of Euclidean space. The first classical work which broadened the traditional logic was written by George Boole under the title *The Laws of Thought*, and since then logicians have felt the insufficiency of Aristotle's logic and the need of deciphering the nature of thought in its operations. They attempted to transfer the accomplishments of mathematics upon logic, and to exhibit the function of reason in formulas, or in graphic presentations, or in algebraic notations. Workers in this line are Ernst Schroeder, Charles S. S. Peirce, Giuseppe Peano, Bertrand Russell, and Louis Couturat. It is a new branch of scientific endeavor and we may expect results of great interest, yea even of far-reaching importance.

The writer's opinion is that labors of this kind constituting the new mathematics and the new logic are quite legitimate. They will widen our horizon but they do not (and never will) reverse, antiquate, or abolish the assured

accomplishments of the past. Neither Bolyai nor Lobatchevsky upsets Euclid and none of the modern logicians will ever set aside Aristotle.

NON-ARISTOTELIAN LOGIC.

Now, it is possible to imagine a fairy-tale world where our scientific conception of cause and effect could be crossed by a causation of miracle. In such a world the magician's word would be endowed with an energy unknown in physics, but it would remain a world governed by law, and the rule of consistency would not be upset. Every effort would presuppose a cause and causation would still be dominated by law. The purely formal rules of Aristotelian logic would not be upset thereby. The mill remains the same even if the grist is changed. We would have law-determinedness or lawdom in both worlds. The forces and materials would be different but not the consistency of the concatenation of events.

Aristotelian logic is incomplete and insufficient. It treats only the most simple relations and does not cover the more complicated cases of thinking, but so far as it goes it is without fault. If we grant that all men are mortal and that Caius is a man, we must make the conclusion that Caius is mortal—otherwise he would not be a man but some immortal being, and this would upset the principle of consistency.

We might assume that there are no uniformities in nature, or that all rules have exceptions, or that the uniformities are mere approximations, in which case we would have a world of haphazard happenings. But that would never upset either *Barbara* or *celarent*, or any other rule of pure logic. The items of actual existence would not be classifiable, but the Aristotelian method would not thereby become wrong.

Some time ago I made the following comment on the nature of logic in the *Primer of Philosophy*, (p. 109):

"Mathematicians with great ingenuity have invented various kinds of mathematics. They have shown that Euclidean geometry is but one actual case among many possible instances. Space might be curved, it might be more than three-dimensional. But no one has yet been bold enough to propound a theory of curved reason.

"And why should there not as well exist a curved logic as a mathematics of curved space? A curved logic would be a very original innovation for which no patent has yet been applied for. What a splendid opportunity to acquire Riemann's fame in the domain of logic!"

Now it happens that my friend, Mr. Francis C. Russell of Chicago, received a letter on sundry topics of modern logic from Mr. Charles S. S. Peirce, known as one of the most prominent logicians, and it contains a most interesting passage which sounds like an answer to this challenge of mine. With the permission of the writer I quote it in this connection:

"Before I took up the general study of relatives, I made some investigation into the consequences of supposing the laws of logic to be different from what they are. It was a sort of non-Aristotelian logic, in the sense in which we speak of non-Euclidean geometry. Some of the developments were somewhat interesting, but not sufficiently so to induce me to publish them. The general idea was, of course, obvious to anybody of sufficient grasp of logical analysis to see that logic reposes upon certain positive facts, and is not mere formalism. Another writer afterward suggested such a false logic, as if it were the wildest lunacy, instead of being a plain and natural hypothesis worth looking into [notwithstanding its falsity]."*

I begin to think that Mr. Charles S. S. Peirce understands something else by Aristotelian logic than I do.

* In giving his consent to publish this extract from his letter, Mr. Charles S. S. Peirce sends an additional explanation which is published on page 158 of the present number.

The world has seen many new inventions. Over the telephone we can talk at almost unlimited distances, and some of our contemporaries fly like birds through the air. Radium has been discovered which is often assumed with a certain show of plausibility to upset the laws of physics, but the invention of non-Aristotelian logic would cap the climax. We make bold to prophesy that the non-Aristotelian logic will abolish Aristotle as little as the non-Euclideans have antiquated Euclid. If it comes it will, if it be sound, give us new viewpoints, but it will not abolish one iota of the well-established truths of the old logic. Of course, a non-Aristotelian logic would be "worth looking into," even if it were a vain attempt. *Nous verrons.*

PROFESSOR BERTRAND RUSSELL'S VIEWS.

Since the publication of my two books on this subject, *Kant's Prolegomena* and *The Foundations of Mathematics*, I came across an article by one of the most famous mathematicians of our time, Professor Bertrand Russell of Cambridge, England, a scholar of great erudition and author of many valuable books, among which is an excellent book on *The Foundations of Geometry*. If Professor James or his pragmatist adherents speak of Euclid as superseded and no longer true, they are not to be taken seriously, and there is no need of refuting them; but the case is different when mathematicians of standing make similar declarations. Professor Russell's article on "Recent Work on the Principles of Mathematics," published in the *International Monthly*, is bewildering to me. The very style and presentation of the subject is fascinating, perhaps because the arguments seem paradoxical. At any rate the author's prominence has caused me to reconsider my own position, but I can only say that in spite of his unquestioned authority I cling to my own views. All I can do is to contrast his ideas with my own, and for the sake of fairness I will

quote extensively from his essay so as to let him present his views in his own words.

I shall begin with a quotation which I heartily endorse. Professor Russell says (pp. 84-85):

"Logic, broadly speaking, is distinguished by the fact that its propositions can be put into a form in which they apply to anything whatever. All pure mathematics—arithmetic, analysis, and geometry—is built up by combinations of the primitive ideas of logic, and its propositions are deduced from general axioms of logic, such as the syllogism and the other rules of inference. And this is no longer a dream or an aspiration. On the contrary, over the greater and more difficult part of the domain of mathematics, it has been already accomplished; in the few remaining cases, there is no special difficulty, and it is now being rapidly achieved. Philosophers have disputed for ages whether such deduction was possible; mathematicians have sat down and made the deduction. For the philosophers there is now nothing left but graceful acknowledgements."

My mode of thinking has complied with the demand. I would replace the expression "axioms of logic" by "the principle of consistency," but otherwise I would feel in perfect agreement with Professor Russell, if his article did not abound in many other statements which appear to me irreconcilable with this unequivocal and simple description of the situation.

The reader will notice that Professor Russell is rather hard on philosophers, but it can not be denied that philosophers, at least many men who have gained fame under that name, have unduly slighted mathematics. It is strange, though perhaps natural, that mathematicians like Schroeder and Peano have distinguished themselves in the construction of an algebra of logic. Furthermore there are a number of modern mathematicians, inspired by the broader and more philosophical conceptions of mathematical notions, who have advanced their science by taking new view-points. Professor Russell mentions three great Germans, Weierstrass, Dedekind and Cantor, whose mer-

its are indubitable. Other names might have been added, such as Clebsch, Grassmann, Fuchs, Klein, Lindemann and Staudt, but I fail to see that any one of them has tried to solve or claims to have solved the philosophical problem of the foundation of mathematics. The great drift of their labors, so far as I can judge, is, with the exception of the work of Grassmann, purely mathematical.

I grant that Euclid has his faults, but I believe that his mistakes can be remedied. I also grant that "he is not an easy author and terribly long winded." I deem his proofs tiresome with the monotonous refrain, *Q. E. D.*, and I would replace his method as suggested above by changing the doctrinary style of propositions into the accomplishment of tasks. But for all that, Euclidean geometry remains classical, and I can not understand Professor Russell's harsh verdict when he says (p. 100):

> "It is nothing less than a scandal that he should still be taught to boys in England. A book should have either intelligibility or correctness; to combine the two is impossible, but to lack both is to be unworthy of such a place as Euclid has occupied in education."

I do not agree with Professor Russell that "to combine the two," (viz., intelligibility and correctness) is "impossible." If that were so we would land in mysticism.

Here is another passage on Euclid. Professor Russell says (p. 98):

> "It has gradually appeared, by the increase of non-Euclidean systems, that geometry throws no more light upon the nature of space than arithmetic throws upon the population of the United States."

True, the formal sciences never supply us with facts; but they offer us a method of dealing with facts, and that is better. Professor Russell continues:

> "Geometry is a whole collection of deductive sciences based on a corresponding collection of sets of axioms. One set of axioms is Euclid's; other equally good sets of axioms lead to other results.

Whether Euclid's axioms are true, is a question as to which the pure mathematician is indifferent; and what is more, it is a question which it is theoretically impossible to answer with certainty in the affirmative. It might possibly be shown, by very careful measurements, that Euclid's axioms are false; but no measurements could ever assure us (owing to the errors of observation) that they are exactly true. Thus the geometer leaves to the man of science to decide, as best he may, what axioms are most nearly true in the actual world."

Since Euclid's geometry consists of constructions of pure thought, since there are no points, lines, surfaces, planes, etc., in the objective world, it is obviously impossible to test the truth of Euclidean propositions by actual measurement. Professor Russell does not define his conception of truth. We would say that a Euclidean proposition is true when it is an adequate or correct description of the results of a construction. The question is not, what axioms are most nearly true in the actual world, but which geometry is most serviceable in calculating the relations that obtain in the actual world.

Professor Russell frequently indulges in mystifications. He says (p. 84):

"Mathematics may be defined as the subject in which we never know what we are talking about, nor whether what we are saying is true. People who have been puzzled by the beginnings of mathematics will, I hope, find comfort in this definition, and will probably agree that it is accurate."

All this is *ingeniosius quam verius*. Statements can easily assume a paradoxical form when they are based upon an inaccuracy of terms. Mathematical propositions do not describe realities, but, because lines and planes are not real, we can not say that what mathematics teaches is "not true." Nor is it fair to define mathematics as "the subject in which we never know what we are talking about."

I understand that Professor Russell bases his view upon the method of some Italian mathematicians who avoid

a discussion of the foundation of mathematics by the use of a conditional "if." They start their proposition by saying, "If I do this, the result will be such and such." The "if" sentence is purely hypothetical and they do not trouble about it, but if it be allowed to stand the result can not be denied. Professor Russell explains the situation thus:

> "Pure mathematics consists entirely of asseverations to the effect that, if such and such a proposition is true of *anything*, then such and such another proposition is true of that thing. It is essential not to discuss whether the first proposition is really true and not to mention what the anything is, of which it is supposed to be true. Both these points would belong to applied mathematics. We start, in pure mathematics, from certain rules of inference, by which we can infer that *if* one proposition is true, then so is some other proposition. These rules of inference constitute the principles of formal logic. We then take any hypothesis that seems assuring, and deduce its consequences. *If* our hypothesis is about *anything*, and not about some one or more particular things, then our deductions constitute mathematics."

We may grant that "the rules of inference constitute the principles of formal logic." But why should it be "essential not to discuss whether the first proposition is really true?" I propose to avoid the vicious "if" which leaves the entire science of mathematics in the air, and to dig down to the bottom rock of our mode of thought and build the foundation that is needed for the superstructure of this noblest and loftiest of all the sciences.

If my conception of mathematics is true we do not need in geometry "a certain number of primitive ideas, supposed incapable of definition and a certain number of primitive propositions or axioms, supposed to be incapable of proof."[4] We remove every trace of particularity and build upon the abstract idea of "anyness" a universe of pure thought which will serve as a model for any possible formation, fictitious or real.

[4] *Ibid.*, p. 84.

Professor Russell lays much stress on the symbolic nature of modern logic, and I grant that the significance of symbolism can not be overrated. I would insist that language of any kind, yea even sense-perceptions, are symbolic, and the very nature of thought is symbolism. Sense-impressions change into sensations and sensations become perceptions solely through becoming symbolic. As soon as a sense-impression of a definite kind has come to represent some fact, an event or an object that causes it, then the sense-perception stands for or symbolizes the fact sensed. This is the origin of thought, and we have defined the soul as "a system of sentient symbols." Professor Russell apparently uses the term "symbol" in the more limited sense of an algebraic symbol. He says (p. 85):

"People have discovered how to make reasoning symbolic, as it is in Algebra, so that deductions are effected by mathematical rules."

Algebraic symbols have the great advantage over language that they are definite and rigid. Language suffers from the fault of being vague. The use of our speech is incredibly loose and even the most common words, such as "to be," "to have," "we," "you," etc. possess several shades of meaning. This is not so in algebra and so logicians hope to overcome the looseness of reasoning in language by the employment of symbols which are as rigidly defined as the algebraic terms. The invention of such terms and of their mode of operation is a difficult task, and it would require a good deal of concentration of thought for any one to familiarize himself with a system of such an algebra of logic; but the gain is rich when we consider that thought acquires thereby the virtue of mathematical exactness. The trouble so far has been that there has been too little cooperation among logicians and almost every one of them invents symbols of his own.

Professor Russell's love of paradox appears in his expo-

sition of the importance of symbolism. He says (pp. 85-86):

"It is not easy for the lay mind to realize the importance of symbolism in discussing the foundations of mathematics, and the explanation may perhaps seem strangely paradoxical. The fact is that symbolism is useful because it makes things difficult. (This is not true of the advanced parts of mathematics, but only of the beginnings.) What we wish to know is, what can be deduced from what. Now, in the beginnings, everything is self-evident; and it is very hard to see whether one self-evident proposition follows from another or not. Obviousness is always the enemy of correctness. Hence we invent some new and difficult symbolism, in which nothing seems obvious. Then we set up certain rules for operating on the symbols, and the whole thing becomes mechanical."

We would not say that "symbolism is useful because it makes things difficult," but because it makes thought exact, and further, though it will prove difficult in the beginning, it will make exact thinking easy. It will show in a formula the machinery of thought and thus will render the process of thinking intelligible. In the same way a beginner in algebra may deem this mode of computation hard, but as soon as he has mastered its principles he will be enabled thereby to solve difficult problems without great exertion.

One of Professor Russell's observations is very good, though again stated in such a way as to make its truth appear in a paradoxical light. We must be on our guard against statements that appeal to us as obvious. The records of the history of philosophy and of religious dogma contain many flagrant instances of ideas deemed to be innate and of truths supposedly so obvious that it was claimed they did not stand in need of any proof. Professor Russell says (p. 86):

"The proof of self-evident propositions may seem, to the uninitiated, a somewhat frivolous occupation. To this we might reply that it is often by no means self-evident that one obvious proposi-

tion follows from another obvious proposition; so that we are really discovering new truths when we prove what is evident by a method which is not evident. But a more interesting retort is, that since people have tried to prove obvious propositions, they have found that many of them are false. Self-evidence is often a mere will-o'-the-wisp, which is sure to lead us astray if we take it as our guide."

When Professor Russell speaks of " a method which is not self-evident" I understand him to mean a method which must first prove its right of existence.

The mathematician should banish from his science any proposition which can show no other title than the claim of self-evidence. For this reason I have endeavored to do away with axioms and to build up mathematics without resorting to assumptions, self-evident statements, or asseverations of any kind. I wish Professor Russell would not describe mathematics as consisting of "asseverations"; the very idea is jarring on my conception of the nature of mathematics.

Among modern mathematicians Professor Peano has distinguished himself by an application of the algebraic method to mathematics in general, and Professor Russell looks up to him as a leader. He says (pp. 86-87):

"The great master of the art of formal reasoning, among the men of our day, is an Italian, Professor Peano, of the University of Turin. He has reduced the greater part of mathematics (and he or his followers will, in time, have reduced the whole) to strict symbolic form, in which there are no words at all. In the ordinary mathematical book, there are no doubt fewer words than most readers would wish. Still, little phrases occur, such as *therefore, let us assume, consider,* or *hence it follows.* All these, however, are a concession, and are swept away by Professor Peano. For instance, if we wish to learn the whole of arithmetic, algebra, the calculus, and indeed all that is usually called pure mathematics (except geometry), we must start with a dictionary of three words. One symbol stands for *zero,* another for *number,* and a third for *next after.* What these ideas mean, it is necessary to know if you

wish to become an arithmetician. But after symbols have been invented for these three ideas, not another word is required in the whole development. All future symbols are symbolically explained by means of these three. Even these three can be explained by means of the notions of *relation* and *class*; but this requires the logic of relations, which Professor Peano has never taken up."

Further down on page 99 Professor Russell says:

"One great advance, from the point of view of correctness, has been made by introducing points as they are required, and not starting, as was formerly done, by assuming the whole of space. This method is due partly to Peano, partly to another Italian named Fano. To those unaccustomed to it, it has an air of somewhat wilful pedantry. In this way, we begin with the following axioms: (1) There is a class of entities called *points*. (2) There is at least one point. (3) If *a* be a point, there is at least one other point besides *a*. Then we bring in the straight line joining two points, and begin again with (4) namely, on the straight line joining *a* and *b*, there is at least one other point besides *a* and *b*. (5) There is at least one point not on the line *ab*. And so we go on, till we have the means of obtaining as many points as we require. But the word *space*, as Peano humorously remarks, is one for which geometry has no use at all."

There is no need of using the word "space," but is not the idea of space of some kind presupposed in the notion of a line, or even in the notion of a point? What is a point except a spot in space? Professor Russell must excuse me for finding Professor Fano's method of avoiding the difficulty comical. He starts "There is a class of entities called *points*. There is at least one point. If *a* be a point, there is at least one other point besides *a*." This is all very nice and begins like a fairy-tale, "Once upon a time." He rushes these statements upon us with an unmitigated abruptness which is truly naive. He has points, lines, distances, directions, but knows nothing of space. The very word "space" is abolished! Such are "the rigid methods employed by modern geometers" that "have deposed Euclid from his pinnacle of correctness"!

I feel strongly inclined to enter into Professor Russell's discussion of Zeno's problem, but space forbids. It would take an essay by itself, but a few comments on the subject may be permitted. Professor Russell presents the issues so interestingly that I wish I could read the whole exposition to my readers. A sample will prove that this is not mere courtesy. Professor Russell speaks of the infinitesimal as follows (pp. 89-90):

"The infinitesimal played formerly a great part in mathematics. It was introduced by the Greeks, who regarded a circle as differing infinitesimally from a polygon with a very large number of very small equal sides. It gradually grew in importance, until, when Leibnitz invented the infinitesimal calculus, it seemed to become the fundamental notion of all higher mathematics. Carlyle tells, in his *Frederick the Great*, how Leibnitz used to discourse to Queen Sophia Charlotte of Prussia concerning the infinitely little, and how she would reply that on that subject she needed no instruction—the behavior of courtiers had made her thoroughly familiar with it. But philosophers and mathematicians—who for the most part had less acquaintance with courts—continued to discuss this topic, though without making any advance. The calculus required continuity, and continuity was supposed to require the infinitely little; but nobody could discover what the infinitely little might be. It was plainly not quite zero, because a sufficiently large number of infinitesimals, added together, were seen to make up a finite whole. But nobody could point out any fraction which was not zero, and yet not finite. Thus there was a deadlock."

So far as I know, mathematicians have never taken this deadlock seriously, for they know that the infinitesimal is a fiction. There are no infinitesimals in the objective world, and in the ideal realm of mathematics it is an attempt to represent a continuum under the aspect of discrete units, which is necessary for the purpose of computation.

We have stated above that all thought is symbolic, and the method of thought depends upon the symbols we employ. There are two possibilities; we can proceed either in a path of uninterrupted motion or we may cover the

ground in steps. The former method is geometrical, the latter arithmetical. The former is a continuous progress, the latter an advance in counting units. The former has the advantage of presenting outlines of pictures in their totality as images; it is qualitative. The latter sums up numbers fit for use in computations; it is quantitative. Now it so happens that sometimes we need one and sometimes the other. A geometrical curve is a continuum, and so if we wish to calculate it we must change it into a series of units with a constant change of direction. The smaller we make these units the more accurate becomes our approximation; only if they could be made zero, would they be correct. But since we needs must conceive them as being ultimately concrete, rectilinear lines, they are treated as infinitesimals. The very idea is an unrealizable fiction, but it serves the purpose of a best possible approximation in describing a continuum in terms of discrete units.

But if the infinitesimal is unreal, because it is a fiction, how can it be useful? We must consider that it is a fiction which serves a purpose. There is a difference between "fiction" and "a fiction." Every mathematical concept is "a fiction" in the sense that it is not a thing, not an actual reality, not a concrete bodily object, but a product of thought, *ein Gedankenwesen,* as Kant calls it. If we treat a product of pure thought as if it were a concrete thing of objective reality we become involved into contradictions and are nonplussed. Here the indefiniteness of language proves a valuable help to mystagogues. We can make paradoxical statements about any mathematical term by an ambiguous use of such words as real, actual, true, etc. We may mean by "real" the concrete materiality of a thing, its definite effciency in existence, or its objective significance. Thus the polar axis around which the earth turns may be called real or absolutely unreal, purely ideal or definite and actual.

In consideration of the paramount significance of relations (i. e. the purely formal aspect of things) the ancient mystic thinker of China said: "Existence makes things actual,[5] but the non-existent in them makes them useful" (*Lao-Tze's Tao Teh King*, Ch. 11).

One of Euclid's postulates declares that "the whole is greater than any of its parts," and we accept this truth for magnitudes; so far as I can see it can have no meaning when applied to items in which the quality of magnitude is absent. Take for instance the purely formal laws of the universe. They are a part of objective reality and yet their sphere of application may truly be said to be larger than that of the whole of which they form a part. By an *a priori* construction they have been developed in the subjectivity of the human mind and their sphere of efficiency applies to any possible world.

The same idea can be stated in religious terms thus: God is part of the All, yet God is greater than the All.

Professor Russell proposes for refutation a maxim shaped in imitation of this same postulate of Euclid. He says when speaking of the evasive nature of obviousness and self-evidence (p. 86):

> "For instance, nothing is plainer than that a whole always has more terms than a part, or that a number is increased by adding one to it. But these propositions are now known to be usually false. Most numbers are infinite, and if a number is finite you may add ones to it as long as you like without disturbing it in the least."

Mark the difference. "The whole is greater than any of its parts" and "the whole has always more terms than a part." Can we not describe the same thing in one term and in an infinite series of terms, as for instance:

$$1 = \tfrac{1}{2} + \tfrac{1}{4} + \tfrac{1}{8} + \tfrac{1}{16} + \tfrac{1}{32} + \textit{ad infinitum}.$$

[5] The common translation of *li* here is "profitable," and the etymology of the character which contains the roots "knife" and "harmony" indicates a meaning such as "cutting" or "efficient." The word is now used in the sense of "sharp." We might translate "pragmatic." But in the present passage it stands in contrast to "useful," and so I prefer the reading "actual" or "real."

The number of terms in which we cast our formula is not identical with the thing described. "One" is not infinite even though we can express it in an infinite series. If we ignore the difference between the thing and the terms in which it is expressed and count the terms numerically or quantitatively with an absolute disregard of their qualitative value, we are compelled to accept Zeno's solution of the problem, that Achilles can not overtake the tortoise in a running match. Professor Russell recapitulates this old conundrum thus (pp. 95-96):

"Let Achilles and the tortoise start along a road at the same time, the tortoise (as is only fair) being allowed a handicap. Let Achilles go twice as fast as the tortoise, or ten times or a hundred times as fast. Then he will never reach the tortoise. For at every moment the tortoise is somewhere, and Achilles is somewhere; and neither is ever twice in the same place while the race is going on. Thus the tortoise goes to just as many places as Achilles does, because each is in one place at one moment, and in another at any other moment. But if Achilles were to catch up with the tortoise, the places where the tortoise would have been, would be only part of the places where Achilles would have been. Here, we must suppose, Zeno appealed to the maxim that the whole has more terms than the part. Thus if Achilles were to overtake the tortoise, he would have been in more places than the tortoise; but we saw that he must, in any period, be in exactly as many places as the tortoise. Hence we infer that he can never catch the tortoise. This argument is strictly correct, if we allow the axiom that the whole has more terms than the part. As the conclusion is absurd, the axiom must be rejected, and then all goes well. But there is no good word to be said for the philosophers of the past two thousand years and more, who have all allowed the axiom and denied the conclusion."

While Professor Russell speaks of Zeno's conclusion as "absurd," and therefore rejects it, he regards the paradox of Tristram Shandy as a mere "oddity" which is a "paradoxical but perfectly true proposition." He says (pp. 96-97):

"The retention of this axiom leads to absolute contradictions, while its rejection leads only to oddities. Some of these oddities,

it must be confessed, are very odd. One of them, which I call the paradox of Tristram Shandy, is the converse of the Achilles, and shows that the tortoise, if you give him time, will go just as far as Achilles. Tristram Shandy, as we know, employed two years in chronicling the first two days of his life, and lamented that, at this rate, material would accumulate faster than he could deal with it, so that, as years went by, he would be farther and farther from the end of his history. Now I maintain that, if he had lived forever, and had not wearied of his task, then, even if his life had continued as eventfully as it began, no part of his biography would have remained unwritten. For consider: the hundredth day will be described in the hundredth year, the thousandth in the thousandth year, and so on. Whatever day we may choose as so far on that he cannot hope to reach it, that day will be described in the corresponding year. Thus any day that may be mentioned will be written up sooner or later, and therefore no part of the biography will remain permanently unwritten. This paradoxical but perfectly true proposition depends upon the fact that the number of days in all time is no greater than the number of years."

I hesitate to say that these two series are equal:

1+1+1+1+1 etc., without end, and

365+365+365+365+365 etc., also without end.

Yet if an infinite number of days will cover an infinite number of years the two series ought to be equal. I am afraid we shall all be hurled into infinity before we can find out the truth as to whether an infinity of days is as large as an infinity of years. If they are equal I should like to know what part the difference will play, since it will be the sum of an infinite series of 364 in each term.

I doubt whether the perverted form of Euclid's axiom is to be blamed (as Professor Russell thinks) for the deadlock to which Zeno's fallacy leads. I would say in explanation of the paradox that an infinite series need not be an actual infinitude. An infinite series is a mental operation, while an infinitude is the objective extension without end. An infinite series sometimes describes a very finite magnitude. For instance, 0.333..... is an infinite

decimal fraction, but the infinite series of its terms (0.3+0.03+0.003....) does not involve that it represents an infinitude. It would take an infinitude to write all the decimals out in their completeness, but for that reason its value (say ⅓ of a second) is quickly passed and is not equal to any other infinite series, as for instance a third of an hour.

An infinite series is a function, and the essential feature of a function is the arrangement and not the number of its terms. If their number is limited we can sum up the *facit*; if it is unlimited or infinite we can never finish the function,—we can only approximate it or must let it stand, but the *facit* has nothing to do with it. It follows from this that two infinite series are not necessarily alike, because they are both infinite. They differ according to their terms and the arrangement of their terms. Here I am in full agreement with Professor Russell when he says, "It must not be supposed that all infinite numbers are equal" (p. 95), and rightly insists on the significance of "the way in which the terms are arranged" (p. 94), and the "particular type of order" (p. 97).

Professor Russell seeks the root of the trouble in the infinitesimal, but it lies there only if we forget the vague character of the infinitesimal, and expect it to be a definite magnitude to boot.

If we had to regard infinitesimals as actual and objective existences, there would be no such things as the next moment, and the smallest part. But in order to prove it we must be careful *not* to think of "moment" as a short yet definite measure of time. We could not prove our case if we said there is no such a thing as the next hour, or minute, or second, or jiffy. We must identify (as does Professor Russell) the word "moment" with the term infinitesimal, viz., the smallest possible fraction of time.

The same is true if we divide a piece of matter. We may come down to very small bits but shall never reach an

infinitesimal. "Nevertheless," says Professor Russell, "there *are* points, only they are not reached by successive division" (p. 91).

True, very true! Yet while in my opinion the propositions that "there is no next moment" and "there are no smallest particles" are due to the notion of the infinitesimal if conceived as an actual existence, Professor Russell attributes these very paradoxes to the abolition of the infinitesimal. He says (pp. 90-91):

"But at last Weierstrass discovered that the infinitesimal was not needed at all, and that everything could be accomplished without it. Thus there was no longer any need to suppose that there was such a thing....

"The banishment of the infinitesimal has all sorts of odd consequences, to which one has to become gradually accustomed. For example, there is no such thing as the next moment....

"The same sort of thing happens in space.... we never reach the infinitesimal in this way."

Professor Russell rejects the infinitesimal but accepts the infinite and he defines it, too. He says (pp. 92-93):

"The philosophy of the infinitesimal, as we have just seen, is mainly negative. People used to believe in it, and now they have found out their mistake. The philosophy of the infinite, on the other hand, is wholly positive. It was formerly supposed that infinite numbers, and the mathematical infinite generally, were self-contradictory. But as it was obvious that there were infinities—for example, the number of numbers—the contradictions of infinity seemed unavoidable....

"Twenty years ago, roughly speaking, Dedekind and Cantor asked this question [What is infinity?], and, what is more remarkable, they answered it. They found, that is to say, a perfectly precise definition of an infinite number or an infinite collection of things. This was the first and perhaps the greatest step. It then remained to examine the supposed contradictions in this notion. Here Cantor proceeded in the only proper way. He took pairs of contradictory propositions, in which both sides of the contradiction would be usually regarded as demonstrable, and he strictly examined the supposed proofs. He found that all proofs adverse to infinity in-

volved a certain principle, at first sight obviously true, but destructive, in its consequences, of almost all mathematics. The proofs favorable to infinity, on the other hand, involved no principle that had evil consequences. It thus appeared that common sense had allowed itself to be taken in by a specious maxim, and that, when once this maxim was rejected, all went well.

"The maxim in question is, that if one collection is part of another, the one which is a part has fewer terms than the one of which it is a part. This maxim is true of finite numbers. For example, Englishmen are only some among Europeans, and there are fewer Englishmen than Europeans. But when we come to infinite numbers, this is no longer true. This breakdown of the maxim gives us the precise definition of infinity. A collection of terms is infinite when it contains as parts other collections which have just as many terms as it has. If you can take away some of the terms of a collection, without diminishing the number of terms, then there are an infinite number of terms in the collection."

I am somehow not satisfied with this definition; nor am I more enlightened through the example adduced for the sake of explanation (p. 93):

"For example, there are just as many even numbers as there are numbers altogether, since every number can be doubled. This may be seen by putting odd and even numbers together in one row, and even numbers alone in a row below:

1, 2, 3, 4, 5, *ad infinitum.*
2, 4, 6, 8, 10, *ad infinitum.*

There are obviously just as many numbers in the row below as in the row above, because there is one below for each one above. This property, which was formerly thought to be a contradiction, is now transformed into a harmless definition of infinity, and shows, in the above case, that the number of finite numbers is infinite."

These several views of Professor Russell on the infinitesimal and the infinite do not seem to me quite consistent. But we shall hear from him again. He claims that there is a greatest infinite number while Cantor has offered a proof that there is none. Professor Russell says (p. 95):

"There is a greatest of all infinite numbers, which is the number of things altogether, of every sort and kind. It is obvious that

there cannot be a greater number than this, because, if everything has been taken, there is nothing left to add. Cantor has a proof that there is no greatest number, and if this proof were valid, the contradictions of infinity would reappear in a sublimated form. But in this one point, the master has been guilty of a very subtle fallacy, which I hope to explain in some future work."

I believe that most mathematicians will side with Cantor. We claim that "the number of things altogether of every sort and kind," is not and can never be "the greatest of all infinite numbers." For suppose we would count all things of every sort and kind, and we had accomplished the task, we could add to it one or two or a few thousand units, we could multiply it with itself and so *ad infinitum*.

So far as I understand the nature of number there can no more be a highest number than there can be an end to space and time.

PROFESSOR BERTRAND RUSSELL'S CRITICISM.

Professor Russell's love of paradox renders his article interesting, but while it makes the reading of it pleasant, I am aware that it sometimes obscures the meaning. Having given it a careful and repeated perusal I am not sure that I have always rightly interpreted his humor. His censure of Euclid may be of this kind. We may agree better than it seemed to me at the first reading.

The problems concerning the foundations of geometry and of mathematics in general are by no means so definitely settled that one solution may be said to have acquired the consensus of the competent, and for this reason I feel that a little mutual charity is quite commendable. I have found it wanting mainly in those circles which represent the two extremes, the old-fashioned Euclideans and the new-fangled non-Euclideans; they scorn and condemn all who look at the problem through some other spectacles than their own. But I am glad to notice that Professor

Russell is not one of these. He can review considerately and kindly the work of one who differs from him on a subject to which he himself has given a great deal of attention. Therefore I here express publicly my recognition of the gentlemanly tone of Professor Russell's review, and having monopolized the floor myself in criticising him, I deem it but just to let him have his turn.

In the *Mathematical Gazette*, Vol. V, No. 80 (June-July, 1909), pp. 103-104, Professor Russell, speaking of my recent work, *The Foundations of Mathematics*, says:

"This book is a more or less popular exposition of a philosophy of geometry which is, in its main outlines, derived from Kant. The main title, if uncorrected by the sub-title, would be somewhat misleading, since the foundations of arithmetic and analysis are not discussed, but only the foundations of geometry. The author begins by a brief account of the development of non-Euclidean geometry, which is followed by much longer chapters "on the philosophical basis of mathematics" and on "mathematics and metageometry." The historical chapter, though it does not profess to give more than a sketch, might with advantage have been enlarged by some account of projective geometry and the projective treatment of metrics. Dr. Carus speaks always as though non-Euclidean straight lines were not really straight, but were merely called straight out of wilfulness. The projective treatment shows, better than the metrical, wherein the straight lines of non-Euclidean spaces agree with those of Euclid, and ought therefore not to be omitted even in a mere outline. It would seem also that Dr. Carus regards a three-dimensional non-Euclidean space as necessarily contained in a four-dimensional Euclidean space, for he asks "what Riemann would call that something which lies outside of his spherical space," apparently not realizing that spherical space does not require anything outside it.

"The author's philosophical theory of geometry may be summarized as follows. Geometry, like logic and arithmetic, is *a priori* but it is not *a priori* in the same degree as logic and arithmetic. There is the *a priori* of being and the *a priori* of doing, and geometry belongs to the latter: it is derived from the contemplation of motion, and can be constructed from the 'principles of reasoning and the privilege of moving about.' We know *a priori* what are the possibilities of motion; thus, although there is nothing *logically* impossible about the

assumption of four dimensions, yet 'as soon as we make an *a priori* construction of the scope of our mobility, we find out the incompatibility of the whole scheme.' The *a priori* is identical with the purely formal, which originates in our minds by abstraction; it is applicable to the objective world because the materials of formal thought are abstracted from the objective world.

"Most of the arguments in the book lead one to expect that Euclid will be declared to be certainly alone valid as against non-Euclidean geometry, yet this is not the conclusion drawn by the author. He says: 'The result of our investigation is quite conservative. It re-establishes the apriority of mathematical space, yet in doing so it justifies the method of metaphysicians in their constructions of the several non-Euclidean systems.... The question is not, "Is real space that of Euclid or of Riemann, of Lobatchevsky or Bolyai?" for real space is simply the juxtaposition of things, while our geometries are ideal schemes, mental constructions of models for space measurement. The real question is, "Which system is the most convenient to determine the juxtaposition of things?" ' (p. 121). Yet a few pages later he says: 'The theorem of parallels is only a side issue of the implications of the straight line' (p. 129). It is not clear how these statements are reconciled, for the earlier statement seems to imply that there is no 'theorem' of parallels at all.

"A few of the author's assertions are somewhat misleading. For example, he states, as a fact not open to controversy, that Euclid's axiom or postulate of parallels originally occurred first in the proof of the twenty-ninth proposition, not being mentioned either among the axioms or among the postulates (p. 2). On the other hand, Stäckel and Engel (*Theorie der Parallellinien*, p. 4) say that, following Heiberg, they do not regard the postulate of parallels as a later addition, which would seem to show that Dr. Carus's opinion is at least open to question. Again he says (p. 84): "While in spherical space several shortest lines are possible, in pseudo-spherical space we can draw one shortest line only.' As regards spherical space, the more exact statement is that in general only one shortest line can be drawn between two given points, but when the two points are antipodes, an infinite number of shortest lines can be drawn between them.

"The book concludes with an epilogue, in which the existence and attributes of the Deity are deduced from the nature of mathematical truth."

With reference to Professor Russell's several comments I will make these statements:

(1) The title of my book read originally "The Foundation of Geometry," but since this designation had been forestalled by Professor Hilbert's book I changed it to "The Foundations of Mathematics" with the subtitle "A Contribution to the Philosophy of Geometry," to make up by it for what may be misleading in the main title.

(2) Though I will grant that a discussion of projective geometry might be added to advantage in an exposition of non-Euclidean geometry, I doubt whether it will help us much in laying the foundation of geometry. I am inclined to think that it might complicate the problem and confound the issue.

(3) I am indeed of the opinion that the use of the term "straight line" had better be limited to the straight line of Euclidean space and that its analogies in other spaces should be named "straightest lines" or be designated by any other term that might be deemed appropriate.

(4) I conceive every kind of space conception as independent and grant that none of them ought to be thought of as being constructed in Euclidean space. But if space is a scope of motion, I can not think of a space that is limited. Spherical space ought to be conceived as possessed of a spherical drift, but for that it ought to be infinite. If it is not infinite, I would ask the question, what is outside? In my opinion we can not get rid of infinitude. The straightest lines in spherical space would not be infinite. They would be merely boundless. Outside of every boundless spherical line we must be able to construct other lines or spherical surfaces and thus spherical space would be as infinite as Euclidean space. I may be wrong but I am willing to learn.

(5) The passage on page 84 is an obvious mistake. When I wrote it I had in mind the Mercator projection

of the globe where both the meridians and the parallels assume the same straightness as the straight lines of Euclidean space. The parallels (so called by geographers) are not shortest lines, but if the parallels on the globe, because they represent straight lines in the Mercator projection, were called straightest lines, we could make them enclose a space with shortest lines on the sphere, or with the parallels of another equatorial system. Of course not being truly shortest lines, the statement is a mistake and I am much obliged to Professor Russell for having called my attention to it.

PARALLELISM AND INFINITY. A COMMENT ON MR. FRANCIS C. RUSSELL'S THEOREM.

Mr. Francis C. Russell, an American namesake of Professor Bertrand Russell, of Cambridge, England, stands up so doughtily for Euclid that he has excited the wrath of non-Euclideans. In his retort courteous to the strictures of his critics he proposes a theorem which would upset Lobatchevsky and Bolyai, if the right angle were and remained the same in non-Euclidean space as in plane geometry. But this is exactly the crux. We need more rigidity in the use of terms.

Our geometricians, Euclid as well as the non-Euclideans, have not always defined with sufficient precision all the names and notions which they introduce. A right angle according to my conception of geometrical notions belongs to the important class of boundary conceptions which on account of their uniqueness become standards of measurement.

The straight line (corresponding to a crease in a sheet of paper folded upon itself) halves the plane, while the right angle (corresponding to the folded sheet of paper again folded upon itself) represents the halved half of the plane. There are innumerable curves, but only one

straight line; and there are innumerable acute and innumerable obtuse angles, but only one right angle. Accordingly we may define the right angle as the angle which represents one-quarter of the entire sweep of direction round a common center. The right angle on a sphere is smaller than in plane geometry; it increases and decreases with the length of the radius and becomes approximately equal to the plane right angle only when the radius becomes infinitely great.

Mr. Russell proves in his theorem that the right angle remains a right angle, but the Russell theorem holds good only for Euclidean space. The right angles in other spaces follow the law of their spaces.

In the same way the term parallel has another sense in plane than in projective geometry. We are told that "lines which meet at infinity are called parallel," but if two lines are truly parallel will they not remain parallel even in infinity? We may freely grant that they will meet at infinity, but it would be better not to introduce this feature in the definition.

The cause of much trouble must be sought in the use of Euclidean terms in a non-Euclidean sense. By a straight line mathematicians formerly understood the straight line in the Euclidean plane, and if we now become acquainted with other lines called straight because they somehow correspond to the straight line of the Euclidean plane, the layman who is only superficially acquainted with the new geometry is naturally puzzled. It is therefore advisable to call the non-Euclidean straight line a "straightest line," or to give it some other suitable name so as to distinguish it from the straight line in the plane.

The same is true of parallels. So far as my linguistic feeling is concerned I cannot overcome the original meaning of the etymology of parallel. Parallel lines are to me lines which remain the same distance apart; thus rail-

road tracks, whether straight or curved, are parallel; and since this running side by side is the original sense of the word, they deserve to be so called. The geographer too uses the word parallel in its etymological meaning. If straight lines are parallel (i. e., keep at the same distance) they do not meet even in infinity,—although I will grant anything for infinity.

Infinity is the land of mathematical hocus pocus. There Zero the magician is king. When Zero divides any number he changes it without regard to its magnitude into the infinitely small; and inversely, when divided by any number he begets the infinitely great. In this domain the circumference of the circle becomes a straight line, and then the circle can be squared. Here all ranks are abolished, for Zero reduces everything to the same level one way or another. Happy is the kingdom where Zero rules!

I do not say that the notion of infinity should be banished; I only call attention to its exceptional nature, and this so far as I can see, is due to the part which zero plays in it, and we must never forget that like the irrational it represents a function which possesses a definite character but can never be executed to the finish. If we bear in mind the imaginary nature of these functions, their oddities will not disturb us, but if we misunderstand their origin and significance we are confronted by impossibilities.

Since in infinity all is reduced to a democratic sameness the points on two parallel lines coincide when they lie at infinity. And the same is true of planes. Suppose we lay down a plane on the absolutely smooth surface of the ocean. It would be tangential to the earth, and the entire range of points at infinity would lie on a line which we will call its infinity-horizon. It is the circumference of a circle, all the diameters of which are infinite straight lines. Now consider that just as two parallel lines cut each

other at infinity, so two parallel planes cut each other in a line at infinity, and we must accept the conclusion that all the infinite number of parallel planes of the entire system of all possible parallel planes upward to an infinite distance and downward to an infinite distance meet at an infinite distance in one line. All their infinity-horizons coincide. Another such a system of planes set at right angles on the horizontal level would behave in the same way. All the perpendicular planes meet in a line which we may call their infinity- meridian. The infinity-meridian is a line which at infinity passes through all the horizontal planes at the point where it cuts their infinity-horizon.

Here the point at infinity is a line and the line is a point.

The infinity-meridian of all the infinite number of perpendicular planes cuts the infinity-horizon of every single plane of the infinite number of horizontal planes, and there are no points in the infinity-meridian which do not cut some of the horizontal planes at infinity. But since all the horizontal planes have only one infinity-horizon, the range of points of the infinity-meridian all lie in the very same point of the infinity-horizon. In other words, the infinity-meridian is one point on the infinity-horizon, and with this point the entire range of its other points will be found to coincide. Thus this line (the infinity-meridian) shrinks into one point and nothing of the infinite extent of the line lies outside this point. Inversely the infinity-horizon is a mere point on the infinity-meridian.

The mathematician may well turn mystic when he moves in infinitudes.

KANTISM AND SPACE.

In a recent number of *The Mathematics Teacher,* Prof. E. D. Roe, Jr., publishes an article under the title "Some Thoughts on Space." He is a Kantian who maintains that "it does not seem that Kant's fundamental principle

that time and space in general are necessary forms of intuition is overthrown." He says (p. 35):

"The simplest hypothesis is not that a handing over to a blank, which is unintelligible, took place, but that reason by its own spontaneity, at least, acted according to the laws of its own activity, and applied its forms and categories to the matter of experience..... If the mind is not constituted so to act space will not result no matter how much experience is had. A cow has the same empirical occasions, but does any one imagine that mathematical space is in a cow's mind, or ever will be, or that it could be revealed to or handed over to the cow, or by any instruction be conveyed to or gotten into the cow's consciousness? If experience could cause its genesis it would be there, for a cow has as much experience as we, doubtless more, because the cow has nothing but experience and all of it in time and space."

Professor Roe differs from Kant in one point. He says (p. 36):

"Kant denied their objective reality. But he should not have done so as by his theory he did not know what was external to the mind. He should have neither denied nor asserted this."

I will not enter here into a discussion of either Kant's or Mr. Roe's doctrine of space. I will only quote what Mr. Roe says of my position:

"The preceding conclusion was reached independently. My attention has since been called to the book of Dr. Carus, *The Foundations of Geometry,* Chicago, The Open Court Publishing Co., 1908. It is a great pleasure to recognize in him a friend and not an antagonist. The results here reached seem to agree with those of Dr. Carus, though the method and standpoint are a little different."

What Kant calls "the empirical occasions" are the single and innumerable experiences we have in life. They are the facts from which we derive our general idea of motion. This general idea of motion is an abstraction. It is not real motion, but the thought of motion. All consideration of energy is omitted from it, it is what Kant would call "pure motion," and the *a priori* constructions

of it, such as lines, angles, triangles, etc., have nothing to do directly with any empirical occasions. The cow can not think in abstractions, and this is the reason why a cow knows nothing of mathematical space.

Mr. Roe objects to the term "abstraction," because it "conveys the idea of unreality." First I would answer that there is no harm in this, for the whole of mathematics is an ideal construction, and it prospers well in the atmosphere of unreality—unreality in the sense that it does not consist of concrete material objects. But secondly I would add that abstractions describe features of real things, and though abstractions as such are not concrete they represent qualities which are real.

Mr. Roe introduces the word "spontaneity" to serve in the place of abstraction, but we are little helped thereby. Spontaneity means self-motion, and it is to be feared that it will involve us into questions as to the nature of mental activity. It is certainly not a simpler conception than pure motion; and actual motion of some kind is absolutely needed in order to give us the abstract notion of either motion or spontaneity. Professor Roe suggests:

> "Why might not one lie perfectly still with eyes closed and receive tactile sensations on different parts of his body and some notion of here and there be called out without the necessity of subjective motion?"

If the notions of "here and there" could originate under these conditions they would be the product of referring to tactile impressions "here" and other impressions, "there." A normal man would use his hand to localize sensations. We do not know which tooth hurts us until we touch the sore spot, but suppose the localization were roughly done internally, we could accomplish it only by allowing our attention to move about from the place of one sensation to that of another. Motion is indispensable for any space-construction.

I will abstain from discussing other points and will only say that such words as "faculty," which Mr. Roe introduces, had better be avoided.

* * *

Professor Bertrand Russell makes the statement that I have derived my philosophy of geometry in its main outlines from Kant, but that is true in a certain sense only. I have started from Kant and retain much of his terminology, but in the most essential points I have come to conclusions diametrically opposed to his.[6] I might as well consider myself a disciple of Grassmann, although I did not become acquainted with his extension theory until later in life; but he was my teacher in mathematics, and I may unconsciously have imbibed from him many notions which like fertile seeds grew up in my mind and are now inextricably intertwined with my own thoughts.

The statement is often made that our mathematical conceptions depend upon our senses. If we had different eyes or other organs of sense, it is claimed, we would have a different notion concerning space. But this is true only so far as our physiological space-conception is concerned, and even there the modification would be slight. It is difficult to prognosticate what space-notions we would have if we were endowed with an electric sense, but it stands to reason that even the perception of electric shocks or the ability to perceive a discharge of electric shocks upon our surroundings would change nothing in our notion of space, for it would have to be interpreted ultimately with the assistance of the sense of touch, which is and will remain the foundation of all sense-perception. I am convinced that the ability to move with great rapidity, which would be acquired by the faculty of flight, would modify our space-conception more than the possession of electric or

[6] For details see my discussion of Kant's doctrines in my little book *Kant's Prolegomena*.

any other additional sense-organs. After all, our notion of space is ultimately based on the self-observation of our own motion. Without motion no space-conception.

Physiological space is dependent to a great extent on our physiological constitution, and the latter again depends upon the conditions in which we live. The feelings "upward" and "downward" are decidedly different, being subject to the factor of gravitation; and mathematically congruent figures in different positions appear different to us on account of the distinction we make between upward and downward, high and low, right and left.[6]

Mathematical space differs from physiological space in being of a more abstract nature. For its construction we need the idea of pure motion alone, which is treated according to the rules of consistency, analogous to pure logic. Accordingly pure mathematics does not depend upon the senses but is the product of the mind. If rational beings, differing from ourselves, have developed on other planets, they might have different notions of physiological space than we have, but they would have the same logic, the same arithmetic, the same geometry, and all the complications derived therefrom.

Helmholtz once pointed out that rational beings who were moving on a sphere would develop a spherical geometry; but, strange to say, he at the same time overlooked the fact that man is actually living on a sphere, and yet our geometry, as it developed in history, is plane and not spherical. We shall scarcely be mistaken when we say that were we to visit other planets we should nowhere find a race of rational beings who developed either the geometry of Lobatchevsky, or Bolyai, or any other non-Euclidean system, before they would discover that plane geometry was also possible. The non-Euclidean geometries prove

[6] For details see Mach's investigations on "Physiological as Distinguished from Geometrical Space," in his excellent little book *Space and Geometry* (Chicago: Open Court Pub. Co., 1906).

that mathematical concepts of any kind are *a priori* in Kant's sense, which means that they are purely mental constructions. The invention of non-Euclidean systems is not useless, for they enable us to generalize our space-conception and subsume geometrical propositions under larger conceptions of different or higher manifoldnesses. We are not able to visualize some of the non-Euclidean spaces, which means we cannot form definite sense-perceptions of them; but we can think them and establish their several laws in abstract formulas. This generalization is a gain because it enables us better to understand the nature of mathematics in general as well as in its particular propositions. However, metageometricians go too far and misunderstand the significance of non-Euclidean geometries, if they treat mathematical space-conceptions as actualities and expect the rival claims of Euclidean and non-Euclidean systems to be decided before the tribunal of the *a posteriori*, i. e., of experience.

CONCLUSION.

Having laid the foundation of geometry without resorting to axioms, merely through the function of pure motion, the latter being ultimately derived from experience through abstraction, by omitting everything particular, I feel confident that I have furnished a conception which satisfies all demands and will be serviceable for all practical purposes. I avoid the mysticism which necessarily results from other interpretations. I may have overlooked applications of importance but I feel confident that all difficulties can be overcome, and that in the main my solution is on the right track.

Dixi et salvavi animam meam.

EDITOR.

THE FUTURE OF MATHEMATICS.[1]

TO foresee the future of mathematics, the true method is to study its history and its present state.

Is this not for us mathematicians in a way a professional procedure? We are accustomed to *extrapolate*, which is a means of deducing the future from the past and present, and as we well know what this amounts to, we run no risk of deceiving ourselves about the range of the results it gives us.

We have had hitherto prophets of evil. They blithely reiterate that all problems capable of solution have already been solved, and that nothing is left but gleaning. Happily the case of the past reassures us. Often it was thought all problems were solved, or at least an inventory was made of all admitting solution. And then the sense of the word solution enlarged, the insoluble problems became the most interesting of all, and others unforeseen presented themselves. For the Greeks a good solution was one employing only ruler and compasses; then it became one obtained by the extraction of roots, then one using only algebraic or logarithmic functions. The pessimists thus found themselves always outflanked, always forced to retreat, so that at present I think there are no more.

My intention therefore is not to combat them, as they are dead; we well know that mathematics will continue to develop, but the question is how, in what direction?

[1] Translated from the French by George Bruce Halsted.

You will answer, "in every direction," and that is partly true; but if it were wholly true it would be a little appalling. Our riches would soon become encumbering, and their accumulation would produce a medley as impenetrable as the unknown truth was for the ignorant.

The historian, the physicist even, must make a choice among facts; the head of the scientist, which is only a corner of the universe, could never contain the universe entire; so that among the innumerable facts nature offers, some will be passed by, others retained.

Just so, *a fortiori,* in mathematics; no more can the geometer hold fast pell-mell all the facts presenting themselves to him; all the more because he it is, almost I had said his caprice, that creates these facts. He constructs a wholly new combination by putting together its elements; nature does not in general give it to him ready made.

Doubtless it sometimes happens that the mathematician undertakes a problem to satisfy a need in physics; that the physicist or engineer asks him to calculate a number for a certain application. Shall it be said that we geometers should limit ourselves to awaiting orders, and, in place of cultivating our science for our own delectation, try only to accommodate ourselves to the wants of our patrons? If mathematics has no other object besides aiding those who study nature, it is from these we should await orders. Is this way of looking at it legitimate? Certainly not; if we had not cultivated the exact sciences for themselves, we would not have created mathematics the instrument, and the day the call came from the physicist, we would have been helpless.

Nor do the physicists wait to study a phenomenon until some urgent need of material life has made it a necessity for them; and they are right. If the scientists of the eighteenth century had neglected electricity as being in their eyes only a curiosity without practical interest, we

should have had in the twentieth century neither telegraphy, nor electro-chemistry, nor electro-technics. The physicists, compelled to choose, are therefore not guided in their choice solely by utility. How then do they choose between the facts of nature? We have explained it in a previous article:[2] the facts which interest them are those capable of leading to the discovery of a law, and so they are analogous to many other facts which do not seem to us isolated, but closely grouped with others. The isolated fact attracts all eyes, those of the layman as well as of the scientist. But what the genuine physicist alone knows how to see, is the bond which unites many facts whose analogy is profound but hidden. The story of Newton's apple is probably not true, but it is symbolic; let us speak of it then as if it were true. Well then, we must believe that before Newton plenty of men had seen apples fall; not one knew how to conclude anything therefrom. Facts would be sterile were there not minds capable of choosing among them, discerning those behind which something was hidden, and of recognizing what is hiding, minds which under the crude fact perceive the soul of the fact.

We find just the same thing in mathematics. From the varied elements at our disposal we can get millions of different combinations; but one of these combinations, in so far as it is isolated, is absolutely void of value. Often we have taken great pains to construct it, but it serves no purpose, if not perhaps to furnish a task in secondary education. Quite otherwise will it be when this combination shall find place in a class of analogous combinations and we shall have noticed this analogy. We are no longer in the presence of a fact but of a law. And upon that day the real discoverer will not be the workman who shall have patiently built up certain of these combinations; it will be he who brings to light their kinship. The first will

[2] See "The Choice of Facts," *The Monist*, April, 1909.

have seen merely the crude fact, only the other will have perceived the soul of the fact. Often to fix this kinship it suffices him to make a new word, and this word is creative. The history of science furnishes us a crowd of examples familiar to all.

The celebrated Vienna philosopher Mach has said that the rôle of science is to produce economy of thought, just as machines produce economy of effort. And that is very true. The savage reckons on his fingers or by heaping pebbles. In teaching children the multiplication table we spare them later innumerable pebble bunchings. Some one has already found out with pebbles or otherwise, that 6 times 7 is 42 and has had the idea of noting the result, and so we need not do it over again. He did not waste his time even if he reckoned for pleasure: his operation took him only two minutes; it would have taken in all two milliards if a milliard men had had to do it over after him.

The importance of a fact then is measured by its yield, that is to say, by the amount of thought it permits us to spare.

In physics the facts of great yield are those entering into a very general law, since from it they enable us to foresee a great number of others, and just so it is in mathematics. Suppose I have undertaken a complicated calculation and laboriously reached a result: I shall not be compensated for my trouble if thereby I have not become capable of foreseeing the results of other analogous calculations and guiding them with a certainty that avoids the gropings to which one must be resigned in a first attempt. On the other hand I shall not have wasted my time if these gropings themselves have ended by revealing to me the profound analogy of the problem just treated with a much more extended class of other problems; if they have shown me at once the resemblances and differences of these, if in a word they have made me perceive the possibility of a

generalization. Then it is not a new result I have won, it is a new power.

The simple example that comes first to mind is that of an algebraic formula which gives us the solution of a type of numeric problems when finally we replace the letters by numbers. Thanks to it a single algebraic calculation saves us the pains of ceaselessly beginning over again new numeric calculations. But this is only a crude example; we all know there are analogies inexpressible by a formula and all the more precious.

A new result is of value, if at all, when in unifying elements long known but hitherto separate and seeming strangers one to another, it suddenly introduces order where apparently disorder reigned. It then permits us to see at a glance each of these elements and its place in the assemblage. This new fact is not merely precious by itself, but it alone gives value to all the old facts it combines. Our mind is weak as are the senses; it would lose itself in the world's complexity were this complexity not harmonious; like a near-sighted person it would see only the details and would be forced to forget each of these details before examining the following, since it would be incapable of embracing all. The only facts worthy our attention are those which introduce order into this complexity and so make it accessible.

Mathematicians attach great importance to the elegance of their methods and their results. This is not pure dilettantism. What is it indeed that gives us the feeling of elegance in a solution, in a demonstration? It is the harmony of the diverse parts, their symmetry, their happy balance; in a word it is all that introduces order, all that gives unity, that permits us to see clearly and to comprehend at once both the *ensemble* and the details. But this is exactly what yields great results; in fact the more we see this aggregate clearly and at a single glance, the better

we perceive its analogies with other neighboring objects, consequently the more chances we have of divining the possible generalizations. Elegance may produce the feeling of the unforeseen by the unexpected meeting of objects we are not accustomed to bring together; there again it is fruitful, since it thus unveils for us kinships before unrecognized. It is fruitful even when it results only from the contrast between the simplicity of the means and the complexity of the problem set; it makes us then think of the reason for this contrast and very often makes us see that chance is not the reason; that it is to be found in some unexpected law. In a word, the feeling of mathematical elegance is only the satisfaction due to any adaptation of the solution to the needs of our mind, and it is because of this very adaptation that this solution can be for us an instrument. Consequently this esthetic satisfaction is bound up with the economy of thought. Again the comparison of the Erechtheum comes to my mind, but I must not use it too often.

It is for the same reason that, when a rather long calculation has led to some simple and striking result, we are not satisfied until we have shown that we should have been *able to foresee,* if not this entire result, at least its most characteristic traits. Why? What prevents our being content with a calculation which has told us, it seems, all we wished to know? It is because, in analogous cases, the long calculation might not again avail, and that this is not so about the reasoning often half intuitive which would have enabled us to foresee. This reasoning being short, we see at a single glance all its parts, so that we immediately perceive what must be changed to adapt it to all the problems of the same nature which can occur. And then it enables us to foresee if the solution of these problems will be simple, it shows us at least if the calculation is worth undertaking.

What we have just said suffices to show how vain it would be to seek to replace by any mechanical procedure the free initiative of the mathematician. To obtain a result of real value, it is not enough to grind out calculations, or to have a machine to put things in order; it is not order alone, it is unexpected order which is worth while. The machine may gnaw on the crude fact, the soul of the fact will always escape it.

Since the middle of the last century, mathematicians are more and more desirous of attaining absolute rigor; they are right, and this tendency will be more and more accentuated. In mathematics rigor is not everything, but without it there is nothing. A demonstration which is not rigorous is nothingness. I think no one will contest this truth. But if it were taken too literally, we should be led to conclude that before 1820, for example, there was no mathematics; this would be manifestly excessive; the geometers of that time understood voluntarily what we explain by prolix discourse. This does not mean that they did not see it at all; but they passed over too rapidly, and to see it well would have necessitated taking the pains to say it.

But is it always needful to say it so many times; those who were the first to emphasize exactness before all else have given us arguments that we may try to imitate; but if the demonstrations of the future are to be built on this model, mathematical treatises will be very long; and if I fear the lengthenings, it is not solely because I deprecate encumbering libraries, but because I fear that in being lengthened out, our demonstrations may lose that appearance of harmony whose usefulness I have just explained.

The economy of thought is what we should aim at, so it is not enough to supply models for imitation. It is needful for those after us to be able to dispense with these models and in place of repeating an argument already

made, summarize it in a few words. And this has already been attained at times. For instance there was a type of reasoning found everywhere, and everywhere alike. They were perfectly exact, but long. Then all at once the phrase "uniformity of convergence" was hit upon, and this phrase made those arguments needless; we were no longer called upon to repeat them, since they could be understood. Those who conquer difficulties then do us a double service; first they teach us to do as they at need, but above all they enable us as often as possible to avoid doing as they, yet without sacrifice of exactness.

We have just seen by one example the importance of words in mathematics, but many others could be cited. It is hard to believe how much a well-chosen word can economize thought, as Mach says. Perhaps I have already said somewhere that mathematics is the art of giving the same name to different things. It is fitting that these things, differing in matter, may be alike in form, that they may, so to speak, run in the same mould. When the language has been well chosen, we are astonished to see that all the proofs made for a certain object apply immediately to many new objects; there is nothing to change, not even the words, since the names have become the same.

A well-chosen word usually suffices to do away with the exceptions from which the rules stated in the old way suffer; this is why we have created negative quantities, imaginaries, points at infinity, and what not. And exceptions, we must not forget, are pernicious because they hide the laws.

Well, this is one of the characteristics by which we recognize the facts which yield great results. They are those which allow of these happy innovations of language. The crude fact then is often of no great interest; we may point it out many times without having rendered great service to science. It takes value only when a wiser thinker per-

gives the relation for which it stands, and symbolizes it by a word.

Moreover the physicists do just the same. They have invented the word "energy," and this word has been prodigiously fruitful, because it also made the law by eliminating the exceptions, since it gave the same name to things differing in matter and life in form.

Among words that have had the most fortunate influence I would select "group" and "invariant." They have made us see the essence of many mathematical reasonings; they have shown us in how many cases the old mathematicians considered groups without knowing it, and how, believing themselves far from one another, they suddenly found themselves near without knowing why.

Today we should say that they had dealt with isomorphic groups. We now know that in a group the matter is of little interest, the form alone counts, and that when we know a group we thus know all the isomorphic groups; and thanks to these words "group" and "isomorphism," which condense in a few syllables this subtle rule and quickly make it familiar to all minds, the transition is immediate and can be done with every economy of thought effort. The idea of group besides attaches to that of transformation. Why do we put such a value on the invention of a new transformation? Because from a single theorem it enables us to get ten or twenty; it has the same value as a zero adjoined to the right of a whole number.

This then it is which has hitherto determined the direction of mathematical advance, and just as certainly will determine it in the future. But to this end the nature of the problems which come up contributes equally. We can not forget what must be our aim. In my opinion this aim is double. Our science borders upon both philosophy and physics, and we work for our two neighbors; so we have

always seen and shall still see mathematicians advancing in two opposite directions.

On the one hand, mathematical science must reflect upon itself, and that is useful since reflecting on itself is reflecting on the human mind which has created it, all the more because it is the very one of its creations for which it has borrowed least from without. This is why certain mathematical speculations are useful, such as those devoted to the study of the postulates, of unusual geometries, of peculiar functions. The more these speculations diverge from ordinary conceptions, and consequently from nature and applications, the better they show us what the human mind can create when it frees itself more and more from the tyranny of the external world, so the better they let us know it in itself.

But it is toward the other side, the side of nature that we must direct the bulk of our army. There we meet the physicist or the engineer, who says to us: "Please integrate this differential equation for me; I might need it in a week in view of a construction which should be finished by that time." "This equation," we answer, "does not come under one of the integrable types; you know there are not many." "Yes, I know; but then what good are you?" Usually to understand each other is enough; the engineer in reality does not need the integral in finite terms; he needs to know the general look of the integral function, or he simply wants a certain number which could readily be deduced from this integral if it were known. Usually it is not known, but the number can be calculated without it if we know exactly what number the engineer needs and with what approximation.

Formerly an equation was considered solved only when its solution had been expressed by aid of a finite number of known functions; but that is possible scarcely once in a hundred times. What we always can do, or rather what

we should always seek to do, is to solve the problem *qualitatively* so to speak; that is to say, seek to know the general form of the curve which represents the unknown function.

It remains to find the *quantitative* solution of the problem; but if the unknown cannot be determined by a finite calculation, it may always be represented by a convergent infinite series which enables us to calculate it. Can that be regarded as a true solution? We are told that Newton sent Leibnitz an anagram almost like this: *aaaaabbbeeeeii*, etc. Leibnitz naturally understood nothing at all of it; but we, who have the key, know that this anagram meant translated into modern terms: "I can integrate all differential equations"; and we are tempted to say that Newton had either great luck or strange delusions. He merely wished to say he could form (by the method of indeterminate coefficients) a series of powers formally satisfying the proposed equation.

Such a solution would not satisfy us to-day, and for two reasons: because the convergence is too slow and because the terms follow each other without obeying any law. On the contrary, the series ⊙ seems to us to leave nothing to be desired, first because it converges very quickly (this is for the practical man who wishes to get at a number as quickly as possible) and next because we see at a glance the law of the terms (this is to satisfy the esthetic need of the theorist).

But then there are no longer solved problems and others which are not; there are only problems *more or less* solved according as they are solved by a series converging more or less rapidly, or ruled by a law more or less harmonious. It often happens however that an imperfect solution guides us toward a better one. Sometimes the series converges so slowly that the computation is impracticable and we have only succeeded in proving the possibility of the problem.

And then the engineer finds this a mockery, and justly, since it will not aid him to complete his construction by the date fixed. He little cares to know if it will benefit engineers of the twenty-second century. But as for us, we think differently and we are sometimes happier to have spared our grand-children a day's work than to have saved our contemporaries an hour.

Sometimes by groping, empirically so to speak, we reach a formula sufficiently convergent. "What more do do you want?" says the engineer. And yet, in spite of all, we are not satisfied; we should have liked *to foresee* that convergence. Why? Because if we had known how to foresee it once, we would know how to foresee it another time. We have succeeded; that is a small matter in our eyes if we cannot validly expect to do so again.

In proportion as science develops its total, comprehension becomes more difficult; then we seek to cut it in pieces and to be satisfied with one of these pieces: in a word, to specialize. If we went on in this way, it would be a grievous obstacle to the progress of science. As we have said, it is by unexpected unions between its diverse parts that it progresses. To specialize too much would be to forbid these drawings together. It is to be hoped that congresses like those of Heidelberg and Rome, by putting us in touch with one another will open for us vistas over neighboring domains and oblige us to compare them with our own, to range somewhat abroad from our own little village; thus they will be the best remedy for the danger just mentioned.

But I have lingered too long over generalities, it is time to enter into detail.

Let us pass in review the various special sciences which combined make mathematics; let us see what each has accomplished, whither it tends and what we may hope from it. If the preceding views are correct, we should see

that the greatest advances in the past have happened when two of these sciences have united, when we have become conscious of the similarity of their form, despite the difference of their matter, when they have so modeled themselves upon each other that each could profit by the other's conquests. We should at the same time foresee in combinations of the same sort, the progress of the future.

ARITHMETIC.

Progress in arithmetic has been much slower than in algebra and analysis, and it is easy to see why. The feeling of continuity is a precious guide which the arithmetician lacks; each whole number is separated from the others, —it has, so to speak, its own individuality. Each of them is a sort of exception and this is why general theorems are rarer in the theory of numbers; this is also why those which exist are more hidden and longer elude the searchers.

If arithmetic is behind algebra and analysis, the best thing for it to do is to seek to model itself upon these sciences so as to profit by their advance. The arithmetician ought therefore to take as guide the analogies with algebra. These analogies are numerous and if, in many cases, they have not yet been studied sufficiently closely to become utilizable, they at least have long been foreseen, and even the language of the two sciences shows they have been recognized. Thus we speak of transcendent numbers and thus we account for the future classification of these numbers already having as model the classification of transcendent functions, and still we do not as yet very well see how to pass from one classification to the other; but had it been seen, it would already have been accomplished and would no longer be the work of the future.

The first example that comes to my mind is the theory of congruences where is found a perfect parallelism to the

theory of algebraic equations. Surely we shall succeed in completing this parallelism, which must hold for instance between the theory of algebraic curves and that of congruences with two variables. And when the problems relative to congruences with several variables shall be solved, this will be a first step toward the solution of many questions of indeterminate analysis.

ALGEBRA.

The theory of algebraic equations will still long hold the attention of geometers; numerous and very different are the sides whence it may be attacked.

We need not think algebra is ended because it gives us rules to form all possible combinations; it remains to find the interesting combinations, those which satisfy such and such a condition. Thus will be formed a sort of indeterminate analysis where the unknowns will no longer be whole numbers, but polynomials. This time it is algebra which will model itself upon arithmetic, following the analogy of the whole number to the integral polynomial with any coefficients or to the integral polynomial with integral coefficients.

GEOMETRY.

It looks as if geometry could contain nothing which is not already included in algebra or analysis; that geometric facts are only algebraic or analytic facts expressed in another language. It might then be thought that after our review there would remain nothing more for us to say relating specially to geometry. This would be to fail to recognize the importance of well constructed language, not to comprehend what is added to the things themselves by the method of expressing these things and consequently of grouping them.

First the geometric considerations lead us to set our-

selves new problems; these may be, if you choose, analytic problems, but such as we never would have set ourselves in connection with analysis. Analysis profits by them however, as it profits by those it has to solve to satisfy the needs of physics.

A great advantage of geometry lies in the fact that in it the senses can come to the aid of thought, and help find the path to follow, and many minds prefer to put the problems of analysis into geometric form. Unhappily our senses cannot carry us very far, and they desert us when we wish to soar beyond the classical three dimensions. Does this mean that, beyond the restricted domain wherein they seem to wish to imprison us, we should rely only on pure analysis and that all geometry of more than three dimensions is vain and objectless? The greatest masters of a preceding generation would have answered "yes"; to-day we are so familiarized with this notion that we can speak of it, even in a university course, without arousing too much astonishment.

But what good is it? That is easy to see: First it gives us a very convenient terminology, which expresses concisely what the ordinary analytic language would say in prolix phrases. Moreover, this language makes us call like things by the same name and emphasize analogies it will never again let us forget. It enables us therefore still to find our way in this space which is too big for us and which we cannot see, always recalling visible space which is only an imperfect image of it doubtless, but which is nevertheless an image. Here again, as in all the preceding examples, it is analogy with the simple which enables us to comprehend the complex.

This geometry of more than three dimensions is not a simple analytic geometry; it is not purely quantitative, but qualitative also, and it is in this respect above all that it becomes interesting. There is a science called *Analysis*

Situs and which has for its object the study of the positional relations of the different elements of a figure, apart from their sizes. This geometry is purely qualitative; its theorems would remain true if the figures, instead of being exact, were roughly imitated by a child. We may also make an *Analysis Situs* of more than three dimensions. The importance of *Analysis Situs* is enormous and cannot be too much emphasized; the advantage obtained from it by Riemann, one of its chief creators, would suffice to prove this. We must achieve its complete construction in the higher spaces; then we shall have an instrument which will enable us really to see in hyperspace and supplement our senses.

The problems of *Analysis Situs* would perhaps not have suggested themselves if the analytic language alone had been spoken; or rather, I am mistaken, they would have occurred surely, since their solution is essential to a crowd of questions in analysis, but they would have come singly, one after another, and without our being able to perceive their common bond.

CANTORISM.

I have spoken above of our need to go back continually to the first principles of our science, and of the advantage of this for the study of the human mind. This need has inspired two endeavors which have taken a very prominent place in the most recent annals of mathematics. The first is Cantorism which has rendered our science such conspicuous service. Cantor introduced into science a new way of considering mathematical infinity. One of the characteristic traits of Cantorism is that in place of going up to the general by building up constructions more and more complicated and defining by construction, it starts from the *genus supremum* and defines only, as the scholastics would have said, *per genus proximum et differentiam spe-*

cificam. Thence comes the horror it has sometimes inspired in certain minds, for instance in Hermite, whose favorite idea was to compare the mathematical to the natural sciences. With most of us these prejudices have been dissipated, but it has come to pass that we have encountered certain paradoxes, certain apparent contradictions that would have delighted Zeno the Eleatic and the school of Megara. And then each must seek the remedy. For my part, I think, and I am not the only one, that the important thing is never to introduce entities not completely definable in a finite number of words. Whatever be the cure adopted, we may promise ourselves the joy of the doctor called in to follow a beautiful pathologic case.

THE INVESTIGATION OF THE POSTULATES.

On the other hand, efforts have been made to enumerate the axioms and postulates, more or less hidden, which serve as foundation to the different theories of mathematics. Professor Hilbert has obtained the most brilliant results. It seems at first that this domain would be very restricted and there would be nothing more to do when the inventory should be ended, which could not take long. But when we shall have enumerated all, there will be many ways of classifying all; a good librarian always finds something to do, and each new classification will be instructive for the philosopher.

Here I end this review which I could not dream of making complete. I think these examples will suffice to show by what mechanism the mathematical sciences have made their progress in the past and in what direction they must advance in the future.

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TRANSFINITE NUMBERS AND THE PRINCIPLES OF MATHEMATICS.

PART I.

One result of Georg Cantor's discovery of the transfinite cardinal and ordinal numbers has been the development of more satisfactory views on the principles of mathematics. To this end, also, the symbolic logic of Peano, Frege, and Russell[1] contributed by enabling one, for the first time, to reach precision in such subjects as the relation of logic to mathematics, and the meaning of "definition" and "existence."

In this first part, I give an account of these things, and, in the second part, I will review the modifications in logic and in our views of the principles of mathematics which progress in the theory of aggregates has necessitated. I hope to show that, just as we have been forced, especially during the nineteenth century, to a more rigorous foundation of the methods and results of mathematical analysis, so we are forced to logical investigations by that development of mathematics to which I have just referred.

In this article I wish to emphasize an aspect in the development of views on the principles of mathematics other than that of the gradual *rapprochement* of mathematics and logic and their final reconciliation owing to the good offices of the logic of relations as promulgated by De Morgan, C. S. Peirce, Schröder, Dedekind, Frege, Peano, and Russell. I wish to point out the service which the theory of transfinite numbers has done first, in drawing atten-

[1] This symbolic logic is a great advance on the older symbolic logic, of which Schröder has given an excellent account (*Vorlesungen über die Algebra der Logik*, 3 volumes, Leipsic, 1890 and subsequent years; part of the third volume is not yet published).

tion to what are known as "the contradictions of the theory of aggregates," and hence to the necessity for a remoulding of logic; and, secondly, in clearly separating cardinal and ordinal numbers in our minds, and so making us, by analogy, more precise in our distinctions of signless integers and positive integers, of the integer n and the ratio $n:1$, and so on. These distinctions have made us give up the "principle of permanence," which formerly played such a great part in mathematics, for we are compelled to admit that it consists in identifying things whose difference is clearly discernible.

Thus, the advance of mathematics has brought it nearer and nearer to logic; the extent of the validity of mathematical conceptions and methods has been examined ever more closely; and it is not difficult to see that, by this, we have attained to a more thorough knowledge, and even, by the capacity which we have gained of avoiding those pseudo-problems to which methods extended beyond their domain of validity give rise, to a *practical* advance.

1.

Cantor was led to see the necessity for introducing certain definitely infinite numbers by his mathematical researches on infinite aggregates of points situated on a finite line (using a geometrical terminology for conceptions which are, in reality, purely arithmetical); but, logically, the theory is independent of this origin, and here[2] I will give the independent grounds on which, in the *Grundlagen*, Cantor made the introduction of these numbers rest.

Among the finite integers $1, 2, \ldots, \nu, \ldots$ there is no greatest, but, although it would be contradictory to speak of a greatest finite integer μ (for there is always a greater one $\mu+1$), there is no contradiction[3] involved in introducing a *new*, non-finite number (ω), which is defined as the *first* number that follows *all* the numbers $1, 2, \ldots, \nu, \ldots$ (in their order of magnitude). The

[2] A very full historical account by me appeared in the *Archiv der Math. und Phys.* for 1906 and 1909, and the rest will appear shortly.

[3] This is the point which will be found to require for its adequate discussion, all the resources of logic (see below).

interest that attaches to the introduction of a series of such "transfinite" numbers, the first ones of which Cantor has denoted:

$$\omega, \omega+1, \omega+2, \ldots, \omega+\nu, \ldots \omega\cdot 2, \omega\cdot 2+1, \ldots \omega\cdot\nu, \ldots\omega^2,\ldots$$
$$\omega^\nu, \ldots\omega^\omega, \ldots\omega^{\omega^\omega}, \ldots, \ldots, \text{(N)}$$

ν being any finite integer, is, of course, to be seen from the history of those mathematical questions which necessitated the introduction of these numbers;[4] but here we are only concerned with the question whether the conception of such numbers is logically possible, that is to say, leads to no contradiction.[5] That Cantor, to most intents and purposes, showed this by his above introduction and subsequent definition of ω, is true, and, further, he successfully classified and answered the objections made by philosophers and mathematicians, from the time of Aristotle, against the actual (or *completed*, as distinguished from the "potential" or "becoming") infinite.[6] A characteristic and illuminating example of this criticism was given *à propos* of Dühring's arguments against the actual infinite (*Eigentlich-Unendlich*).[7] These arguments can, said Cantor, be reduced, either to the statement that a definite finite number, however large, can never be infinite (a statement which is a truism) or that a variable unlimitedly great finite number can not be thought of with the predicate of definiteness, and hence also not with the predicate of being (which again immediately results from the essence of variability). To conclude, as Dühring does, the non-thinkability of definitely infinite numbers is like arguing that, because there are innumerable intensities of green, there can be no red.[8]

[4] The use of transfinite numbers in important questions of mathematics has been shown, for example, by G. H. Hardy (*Proc. Lond. Math. Soc.* (2), vol. I, 1904, pp. 285-290) and myself (*Mess. of Math.*, April, 1904, pp. 166-171, and Crelle's *Journ. für Math.*, Bd. CXXVIII, 1905, pp. 169-210).

[5] Cantor (*Grundlagen einer allgemeinen Mannichfaltigkeitslehre*, Leipsic, 1883, pp. 18-20), maintained the thesis that the formation of concepts in mathematics is completely *free*, and has only to satisfy the condition of the logical consistency of these concepts with one another. Such concepts then have "existence" (in mathematics). Cf. below on the question whether "freedom from contradiction" is necessary or sufficient for the "existence" of a concept.

[6] *Grundlagen*, pp. 9-18, 43-46; *Zur Lehre vom Transfiniten*, Halle a. S., 1890 (reprint of Cantor's articles in the *Zeitschr. f. Phil. u. philos. Kritik*, Bde. LXXXVIII, XCI, and XCII, 1885-1887).

[7] See *Grundlagen*, pp. 44-45.

[8] The arguments against the infinite in mathematics have also been discussed exhaustively by Couturat (*De l'infini mathématique*, Paris, 1896, pp.

The logically exact investigation as to the existence of numbers defined by an infinite process (as ω is by the finite numbers, or an irrational number by the rationals) was begun by Russell, and I return to the question in the next section.

The series of the transfinite numbers was, now, shown by Cantor to fall into certain divisions, which he called "number-classes"; which are characterized by the property that, if α and β are any numbers of the same class, all the numbers (from 1 on) preceding α can be brought (in a different order, of course) into a correspondence,[9] which is one-one, with all those preceding β; and inversely Cantor expressed this by saying that the first class of numbers had the same "power" as the second, or that one, and only one, "power" belonged to each "number-class."

Thus, in addition to the series of finite and transfinite (ordinal) numbers, there is a series of finite and transfinite powers; for finite aggregates the conceptions of power and (ordinal) number appear to coincide,[10] and such an aggregate has always the same number, however it may be arranged; but a given infinite aggregate, though no re-arrangement can alter its power, since this attribute is, by the definition, independent of order, can have various (ordinal) numbers,—in fact, any number of a certain class,—according to the way in which it is arranged.

But, even when an aggregate is "simply ordered" (that is to say, when an "order" is given to the terms of an aggregate such that, if a and b be any two terms, a either *precedes* or *follows* b in virtue of some relation, not necessarily in order of space or time), it need not have an ordinal number. In fact, Cantor's ordinal numbers only apply to certain kinds of ordered aggregates, which he called "well-ordered," and which are characterized by the property that any selection of terms has, in the order of the original series, an element of lowest rank. Thus, the series

441-503) and by Russell (*The Principles of Mathematics*, vol. I, Cambridge, 1903, pp. 355-362).

[9] See below.

[10] However, strictly speaking they do not *coincide*. The point is the same as the one about signless integers (classes) and positive integers (relations) referred to below.

$$a_1, a_2, \ldots, a_\nu, \ldots; b_1, b_2$$

is well-ordered, but not the series

$$b_1, b_2; \ldots, a_\nu, \ldots, a_2, a_1,$$

where ν is any finite number and the dots indicate that *all* the a_ν's, where ν is finite, occur in the order shown. Accordingly, Cantor generalized and renamed his fundamental concepts in the theory of transfinite numbers as follows:[11]

"By an 'aggregate' or 'manifold' (*Menge*), we understand any collection by the mind (*Zusammenfassung*) M of definite well-distinguished objects m of our intuition or of our thought (which are called the 'elements' of M) to a whole.

"Every aggregate M has a definite 'power,' which we also call 'cardinal number.'

"We call 'power' (*Mächtigkeit*) or 'cardinal number' of M the general concept which, by means of our active faculty of thought, is obtained from the aggregate M by abstracting from the nature (*Beschaffenheit*) of its different elements m and from the order in which they are given."

Cantor proved that, in order that two aggregates, M and N, should have the same cardinal number, it is necessary and sufficient that they should be "equivalent"[12] (*äquivalent*), that is to say, that there should be a one-one correspondence between the elements m and the elements n. The operations of addition, multiplication, and exponentiation for cardinal numbers were then defined,[13] and certain other questions of mathematical importance investigated, including a short treatment of the *finite* cardinal numbers[14] and the smallest transfinite cardinal number ($\aleph_0$).[15] But also, what concerns us intimately at present, Cantor also mentioned a series of

[11] *Math. Ann.*, Bd. XLVI (1895), pp. 481-512; Bd. XLIX (1897), pp. 207-246.

[12] Russell has used the word "similar" instead of "equivalent" and "like" instead of "similar" (Cantor's *ähnlich*, see below); while Dedekind used *ähnlich* where Cantor used *äquivalent*. At Dr. Carus's suggestion, we follow Cantor's terminology here.

[13] *Math. Ann.*, XLVI, pp. 485-488.

[14] *Ibid.*, pp. 489-492.

[15] *Ibid.*, pp. 492-495.

cardinal numbers ascending in magnitude and such that there is no cardinal number between two consecutive terms of the series:

$$\aleph_0, \aleph_1, \aleph_2, \cdots, \aleph_\nu, \cdots \aleph_\omega, \aleph_{\omega+1}, \cdots, \aleph_\gamma, \cdots; \text{(A)}$$

as a subject for future investigation,[16] and implied that every transfinite cardinal number is to be found in this series. The conception of an "ordered aggregate" was then introduced:[17]

"We call an aggregate M 'simply ordered,' if a definite 'order of precedence' (*Rangordnung*) rules its elements m, so that of any two elements m_1 and m_2 one takes the 'lower' and the other the 'higher' rank; and so that if of three elements m_1, m_2, and m_3, m_1 is lower than m_2 and m_2 lower than m_3, m_1 is always lower than m_3." Such orders are order of magnitude and order of succession in time. Evidently, we are presupposed to have the idea of such a relation in general and it is not defined.

"Every (simply-) ordered aggregate has a definite *'ordinal type,'* by which we understand the general concept which results from M, when we abstract from the nature of the elements m, but retain the order of precedence among them." That two ordered aggregates should have the same type, it is necessary and sufficient they should be "similar" (*ähnlich*); that is to say, that there should be a one-one correspondence such that the order of precedence of corresponding elements is kept.

An important case of a simply-ordered aggregate is a "well-ordered aggregate,[18] which has been characterized above. The types of well-ordered aggregates were, now, called "ordinal numbers," and thus we arrive at the series (N). Now, the cardinal numbers of the various "segments"[19] of this series (N) form the series (A), which is such that there is no cardinal number which lies, in magnitude, between two consecutive Alephs, and none less than any one (for example consider $\aleph_\omega$) which is not one of the Alephs preceding

[16] *Ibid.*, pp. 495, 484.

[17] *Ibid.*, pp. 496-498.

[18] See the article in *Math. Ann.*, Bd. XLIX.

[19] The "segment" defined by the term a of a well-ordered series is the series of all terms preceding a. Cantor used the word *Abschnitt* (*Math. Ann.*, Bd. XLIX, p. 210).

that one in (A). Further, (A) possesses the remarkable property of being similar to (N). The other investigations of Cantor on ordinal numbers are of more exclusively mathematical interest.

In the question as to the existence of the various cardinal numbers and ordinal types defined by Cantor, there was still an opportunity left for skepticism, and one of the chief objects of Russell's work[20] was so to define the numbers as to leave no doubt about their existence. We must, then, next give an account of that part of modern work on symbolic logic which is necessary for the comprehension of this object.

II.

Peano's logical calculus differs from the previous systems of algebra of logic[21] in one or both of the respects of being more convenient in symbolism and of containing more subtle distinctions between certain fundamental ideas. Thus, in the latter respect, Peano had the distinction, which was not possessed by Schröder[22]

[20] Cf. *op. cit.*, pp. ix, 111-116, 277-286, 313, 321-322, 497-498.

[21] Although Leibniz had worked out projects of an algebra of logic and a general symbolism, his work in this direction only began to be known when his manuscripts began to be published by. J. E. Erdmann in 1840. The work in this direction of Leibniz's successors—of whom the greatest was J. H. Lambert—made little impression, and it was George Boole and Augustus De Morgan, about the middle of the nineteenth century, who must be regarded as the true founders of what we now know as symbolic logic. A valuable work of an orthodox Boolian character, containing much careful historical research, is J. Venn's *Symbolic Logic*, London, 1880 (2d. ed., 1894); and the most complete works on the logic of Leibniz are: B. Russell, *A Critical Exposition of the Philosophy of Leibniz*, Cambridge, 1900; and L. Couturat, *La logique de Leibniz d'après des documents inédits*, Paris, 1901, and *Opuscules et fragments inédits de Leibniz*, Paris, 1903.

It must be mentioned that the introduction of "propositions containing variables" and of implication between them was first explicitly made by H. MacColl in 1878. Still MacColl did not observe, like Frege and Peano, that these notions made it possible to formulate all mathematical deductions in symbols—what was impossible with the traditional or Aristotelian logic—and indeed, as Russell has shown, rather confused the essential difference between these *propositional functions* and *propositions* proper. The logic of relations of De Morgan, Peirce, Schröder, Frege, Dedekind, Peano and Russell will be referred to afterwards.

[22] Cf. Schröder, *op. cit.*, Bd. II, 2. Abteilung, Leipsic, 1905, pp. 461, 597; *Verh. d. Math. Congr. in Zürich*, Leipsic, 1898, p. 154; G. Frege, *Kritische Beleuchtung einiger Punkte in E. Schröders Vorlesungen über die Algebra der Logik, Archiv für systemat. Phil.*, I, 1895, pp. 433-456; *Grundgesetze der Arith.*, I, Jena, 1893, p. 2; Russell, *Principles*, pp. 19, 78; Couturat, *Les Principes des mathématiques*, Paris, 1905, pp. 22-21 (a German translation of this book by C. Siegel was published at Leipsic in 1908 under the title: *Die philosophischen Prinzipien der Mathematik*).

Frege's work, which began in 1879, is of a far more subtle character than

or any other previous writer, between "the class (or individual) *a is a member* of the class *b*" and "the class *a is contained in* the class *b*"; the former was symbolized by Peano $a \epsilon b$, the latter by a different sign;[23] and the latter may be defined: $x \epsilon a$ implies, for every such x, $x \epsilon b$.

Again, Peano distinguished between a term (say x) of a class and the class (ιx) composed of that single term, treated the conception of the "variable" at some length, and so on.

While referring for more detailed accounts of Peano's system of writing all mathematical propositions in logical symbolism, which implies a calculus of logic, to other works,[24] we shall here notice more particularly some points in it and in Russell's work of great importance to us in our present subject.

* * *

When the propositions a, b, said Peano,[25] contain undetermined entities $x, y, \ldots$,[26] as they do in general, then the suffix $x, y, \ldots$ attached to the sign of implication between a and b makes the whole read: "a implies b, whatever $x, y, \ldots$ may be" (provided, of course, they satisfy the conditions that may have been imposed on them at the beginning), and if a and b contain two groups of undeter-

Peano's (cf. Russell, *op. cit.*, pp. 500-522), and consequently far more suited to the investigation of the principles of mathematics—for which purpose, indeed, his ideography was invented. His symbolism, however, is so cumbrous, that Russell, who, independently of Frege, arrived at many of Frege's points of view, combined Frege's ideas with Peano's symbolism (slightly modified) in his most recent work (*Amer. Journ. of Math.*, XXVIII, 1906; and XXX, 1908).

[23] Since Peano wrote $b \mathrm{C} a$ for "b contains a," for "a is contained in b" he used a sign which is a deformation of an inverted C.

[24] See pp. 370-378 (on the symbolism of Peano and Russell) in Whitehead's Memoir *On Cardinal Numbers* (*Amer. Journ. of Math.*, Vol. XXIV, 1902, pp. 367-394); the references to the calculus of logic in the works of Russell and Couturat, and to Peano's logic in Russell, *op. cit.*, pp. 26-32, and Couturat, *op. cit.*, pp. 5, 6, 18, 24, 27; Peano's various *Formulaires* and the volumes of his *Rivista di matematica*; and Couturat's account of the work of Peano and his school in the *Bull. des sci. math.*, 2e série, t. XXV, 1901.

[25] *Arithmetices Principia nova methodo exposita*, Turin, 1889, p. viii; *Notations de logique mathématique*, Turin, 1894, pp. 16-18, 20-22.
On the subject of the variable, propositional functions, formal implication, individual and class, see Couturat, *op. cit.*, pp. 17, 21-23.

[26] We may restrict $x, y, \ldots$ to be real or imaginary numbers, points, classes, propositions,.... For example "x and y are (real or complex) numbers" implies (whatever numbers x and y may be) $(x+y)^2 = x^2 + 2xy + y^2$.

mined entities $x, y, \ldots$ and $u, v, \ldots$, and we wish to say that $u, v, \ldots$ are such that, whatever $x, y, \ldots$ may be, a implies b, then we write as suffixes only the entities $(x, y, \ldots)$ with respect to which we make the deduction. The resulting proposition is then a condition between $u, v, \ldots$, and is independent of $x, y, \ldots$.[27]

If the value of a formula does not depend on the undetermined entity in it, just as the value of a definite integral does not depend on the variable (x) of integration, it is not necessary to explain the signification of x, as was done above.

If p is a proposition containing a variable x, we denote the class of x's which satisfy p_x by $x \ni p_x$ and read it: "the x's *such that* p_x is true." If p_x contains other variables $u, v, \ldots$ besides x, $x \ni p_x$ denotes a class which is a function of $u, v, \ldots$, but independent of x.

III.

All the propositions of pure mathematics are, according to Russell,[28] of the form "p implies q," where p and q are propositions containing one or more variables, the same in the two propositions, and neither p nor q contains any constants except logical constants. Logical constants are all notions definable[29] in terms of the following: Implication, the relation of a term to a class of which it is a member (ϵ), the notion of *such that*, the notion of relation, and such further notions as may be involved in the general notion of propositions of the above form. In addition to these, mathematics uses a notion which is not a constituent of the propositions which it considers, namely, the notion of truth. A proposition[30] is de-

[27] Thus, if x is a real number $(x \epsilon q)$, and we write $x \epsilon q$ implies, for any such v, $ax^2+bx+c=0$, the proposition is "a, b, c are such that, whatever x is, $ax^2+bx+c=0$." The implication *without* any index (which is equivalent to that with *all* the indices x, a, b, c) states the false proposition: "whatever numbers x, a, b, c are, $ax^2+bx+c=0$."

[28] *Op. cit.*, p. 3; cf. Couturat's book quoted—which may be described as a more popular exposition of Russell's work—pp. 1-6.

[29] For the meaning of this term, see below.

[30] The calculus of propositions (Russell, *op. cit.*, pp. 13-18, Couturat, *op. cit.*, pp. 8-16) must precede those of classes (Russell, *op. cit.*, pp. 18-23; Couturat, *op. cit.*, pp. 16-26) and of relations (Russell, *op. cit.*, pp. 23-26; Couturat,

finable as "that which implies itself,"[31] and must be distinguished clearly from what Peano (and Russell in the above statement) called "a proposition containing a variable," and Russell, in far preferable language, a "propositional function."[32] A proposition, we may say, is anything that is true or that is false. An expression such as "x is a man" is, therefore, not a proposition; but if we give to x any constant value whatever,[33] the expression becomes a proposition. This schematic form standing for any one of a whole class of propositions is called a "propositional function," and we may explain, but not define, this notion as follows: ϕx is a propositional function if, for every value of x, ϕx is a proposition, determinate when x is given. In this, x is called the *variable*, and we may say that a propositional function is, in general, true for some values of the variable and false for others.

When we say "x is a man implies x is mortal for all values of x," we have a genuine proposition, in which, though the letter x appears, it is absorbed in the same kind of way as the x under the integral sign in a definite integral, so that the result is no longer a function of x. In this case, x is what Peano called an "apparent variable," since the proposition does not depend upon the variable; whereas the variable was called "real" in propositional functions. Genuine propositions do not depend upon a variable or variables.[34]

op. cit., pp. 27-34), since the principles of the calculus of propositions are used in all reasoning.

On the calculus of classes, cf. the note on the theory of aggregates in Couturat, *op. cit.*, pp. 219-228.

The logic of relations, the mathematical importance of which was shown by Dedekind's application of it (Dedekind himself rediscovered much of it independently) and by Schröder's work, was, as Schröder rightly observed (*Verh. des ersten Math.-Congr. in Zürich, 1897*, Leipsic, 1898) somewhat neglected by Peano to the disadvantage of his logic. It was Russell (*Rev. de Math.*, VII) who first completed Peano's logic by a logic of relations in which the Peirce-Schröder ideas were modified so as to fit in with a logic which comprised more subtle distinctions than that of Schröder. Cf. Couturat, *op. cit.*, pp. 27-28.

Cf also Frege, *Begriffsschrift, eine der arithmetischen nachgebildete Formelsprache des reinen Denkens*, Halle a. S., 1879 (Frege's work on ideography), pp. 15-24; *Funktion und Begriff*, Jena, 1891; *Grundgesetze*, I, 1893, pp. 5-25.

[31] Russell, *op. cit.*, p. 15.

[32] *Op. cit.*, pp. 12-13, 19-20; cf. Couturat, *op. cit.*, pp. 17-18.

[33] Such as "Socrates," "Plato," "the number 2."

[34] On the notion of the "variables" (the presence of which is marked by

In pure mathematics we assert what Russell[36] called the *formal implication*[36]: "$\phi(x, y, \ldots)$ implies $\psi(x, y, \ldots)$, whatever values $x, y, \ldots$ may have"; but we do not assert either ϕ or ψ of the entities $x, y, \ldots$; whilst, in applied mathematics, results which have been shown by pure mathematics to follow from some hypothesis are actually asserted of some constant satisfying the hypothesis in question. Thus terms which were variables become constant, and a new premise is always required, namely: this particular entity satisfies the hypothesis in question.[37]

The values of x "such that" ϕx is true form a class, and Russell[38] defined a class as all the terms satisfying some propositional function. That some limitation was required in this statement was recognized by Russell himself, in consequence of the contradiction discovered by him;[39] and this limitation, which forms indeed the kernel of our investigations, will be discussed at length hereafter.

IV.

The treatment of the meanings which can be attached to the word "definition" by Peano[40] and Burali-Forti prepared the way for a thoroughly satisfactory theory.[41]

The simplest form of a definition is, in Peano's symbolism,

$$x = a \qquad \mathrm{D}f.,$$

where x is a sign which has not, as yet, a signification, a is a group of signs having a known signification, and the sign of equality followed by "Df" — note that "$=\mathrm{D}f$" is one sign — indicates that we agree, for the sake of brevity, because the group

the occurrence of the words *any* or *some*, and may take any values) and "constants" in logic, see Russell, *op. cit.*, pp. 5-8, 89-94; Couturat, *op. cit.*, pp. 21-24; and Frege, "Was ist eine Funktion?" *Boltzmann-Festschrift*, 1904, pp. 656-666.

[36] *Op. cit.*, p. 5.

[36] As distinguished from the *material implication* (*op. cit.*, p. 14) between genuine propositions.

[37] Russell, *op. cit*, p. 8; cf. Couturat, *op. cit.*, pp. 4-5.

[38] *Op. cit.*, p. 20.

[39] *Op. cit.*, pp. 366-368, 101-107.

[40] *Notations*, pp. 44-51; *Les définitions mathématiques* (Bibl. du Congrès Internat. de Phil., III, "Logique et histoire des sciences," Paris, 1901, pp. 279-288).

[41] On definitions see also Frege, *Grundgesetze*, I, 43-52; II (1902), 69-80.

a denotes an important concept, to write the simple sign x instead of the group a.[42] Sometimes what we define is not a simple sign, but a group of signs, between which there are new signs, or a group of signs which have a signification separately, but such that their aggregate has not yet a signification. Then the definition follows an hypothesis (h) and has the form:

$$h \text{ implies that } x=a \qquad Df.^{43}$$

There are ideas, which we obtain by abstraction, which cannot be defined under the above form.[44] Let u be an object; by abstraction we deduce a new object ϕu; we cannot form an equality:

$$\phi u = \text{known expression} \qquad Df.,$$

for ϕu is an object of nature different from all those considered hitherto. Then we define *equality*[45] as follows:

$$h_{u,v} \text{ implies: } \phi u = \phi v .=. p_{u,v} \qquad Df.,^{46}$$

where $h_{u,v}$ is the hypothesis on the objects u and v, and $\phi u = \phi v$ is the equality which we define as meaning the same thing as $p_{u,v}$, a relation, with a known meaning, between u and v, which must satisfy the three conditions of being:

[42] Thus, Russell said (*op. cit.*, p. 429): "What distinguishes other branches of mathematics from logic is merely complication, which usually takes the form of an hypothesis that the variable belongs to some rather complicated class. Such a class will usually be denoted by a single symbol; and that the statement of the class in question is to be represented by such and such a symbol is what mathematicians call a *definition*. That is to say, a definition is no part of mathematics at all, and does not make any statement concerning the entities dealt with by mathematics, but is simply and solely a statement of a symbolic abbreviation: it is a proposition concerning symbols, not concerning what is symbolized." As regards the *philosophical* meaning of "definition," see *op. cit.*, pp. 15, 27, 111-112. Also (*op. cit.*, p. 15): "In the mathematical sense, a new propositional function is said to be defined when it is stated to be equivalent to (i. e., to imply and be implied by) a propositional function which has either been accepted as indefinable or has been defined in terms of indefinables." Cf. Couturat, *op. cit.*, pp. 10, 36-37.

[43] For example, in the definition of e^x as a power-series, the hypothesis is that x is a (real or complex) number.

[44] Peano, *Notations*, pp. 45-49.

[45] See the fifth section.

[46] Peano used dots (., :, ∴, ::) to separate the parts of a proposition, and the main implication of a proposition is always that immediately preceded or followed by the greatest collection (in one place) of dots. Further, dots between propositions are a sign of joint assertion or "logical multiplication" (p and q). Thus, in the proposition (if the letters denote propositions): p implies $q.x$: implies.r or s ∴ implies.t, the part p to s is the hypothesis (analyzable into an hypothesis "p implies q, and the proposition x is asserted" and the protasis "r or s",—a "logical addition") and t is the protasis (cf. *Notations*, pp. 11-13).

1. *Reflexive*; that is to say, $\phi u = \phi u$ or $p_{u,u}$ is true, whatever u is;

2. *Symmetrical*; that is to say, $\phi u = \phi v$ implies $\phi v = \phi u$, or $p_{u,v}$ implies $p_{v,u}$;

3. *Transitive*; that is to say, $\phi u = \phi v$ and $\phi v = \phi w$ imply that $\phi u = \phi w$, or $p_{u,v}$ and $p_{v,w}$ imply $p_{u,w}$.[47]

Among his examples, Peano gave[48] Stolz's[49] definition of a rational number. If a and b are natural numbers and b is not a multiple of a, the expression $\frac{b}{a}$ has no meaning; but we make to correspond to the couple a, b, a new object, different from all those we have considered hitherto, which we will denote by $\frac{b}{a}$, and which we define by the relation of equality, which satisfies our three conditions.

$$\frac{b}{a} = \frac{d}{c} .=. \quad ad = bc \qquad \text{D}f.^{50}$$

Again, the "upper limit of a class of rational numbers a" ($l'a$) was defined[51] by abstraction (b being also a class of rational numbers):

$l'a = l'b .=.$ "If x is any rational number; then, if there are any members of a greater than x, there are members of b greater than x, and *vice versa*." Df.

Definitions are not, strictly speaking, necessary. Thus, each proposition on irrational numbers (the foregoing "upper limits") is a proposition on aggregates of rational numbers; each proposition on rational numbers becomes a proposition on whole numbers; and so on. A definition has no need of proof, it is merely the effect of our will to represent a group of signs by a simpler expression. We have not, for example, to prove the existence of what we define. Naturally, it is proper to define existent things in practice, but

[47] Cf. papers by Vailati and De Amicis in *Riv. di Mat.*, I, 1891.

[48] *Op. cit.*, p. 47.

[49] *Vorlesungen über allgemeine Arithmetik*, Bd. I, p. 43.

[50] In this line, the sign = has, with Peano, three different meanings: the first, equality as defined by abstraction; the second, equality by Df; and the third, equality between whole numbers.

[51] Peano, *op. cit.*, p. 47; cf. *Arith. Princ.*, p. 15, and *Formulario de Mathematica*, 1905, p. 105.

sometimes we define things which do not exist. Thus Euclid,[52] in order to prove that the number of primes is infinite, said: Let us put $\delta\epsilon$ = smallest common multiple of the primes; and then proved that $\delta\epsilon$ does not exist.

We cannot define everything; to define a sign x, we must be able to compose a sign a from known signs such that we have $x=a$ Df. Thus, we must know some signs already. The question, Can the object x be defined? is not quite correctly put; we should rather say: Can x be defined by means of the objects $a, b, \ldots$?, and there is a certain amount of arbitrariness[53] as to which objects we take as ultimate,—the minimum of objects with which we can begin a logic, or "primitive ideas." These ideas, said Peano,[54] "must be acquired by experience or by induction; it is impossible to explain them by deduction." The primitive ideas of a science constitute the smallest dictionary which must be common to two men who speak different languages, in order that they may be able to understand one another on the subjects of this science.[55]

This determination of a primitive idea by a group of primitive propositions or postulates concerning it, was admitted under the name of "definitions by postulates" by Burali-Forti[56] as one of the three legitimate forms of definition in mathematics. To "define" an object x means: "to give one or many logical relations containing x, and such that, an element y being given, it is possible to affirm or deny the relation $x=y$."[57] In other words, x is defined

[52] Book IX, prop. 20.

[53] Thus, if by means of a, b, c, we can define d, and by means of a, b, d, we can define c, we can take for primitive ideas either a, b, c, or a, b, d. See also Russell, *op. cit.*, p. 111.

[54] *Op. cit.*, p. 50.

[55] Russell called the primitive ideas "indefinables" and enumerated them, and "logical constants" was the name he gave to all notions definable in terms of them (*op. cit.*, pp. 3, 4, 7-8, 11; Couturat, *op. cit.*, pp. 37-39).

[56] *Sur les différentes méthodes logiques pour la définitions du nombre réel*, (*Bibl. du Congrès Internat. de Phil.*, "Logique et histoire des sciences," III, pp. 294-307, especially pp. 294-296).

[57] This means (Burali-Forti, *loc. cit.*, pp. 292-293), that *every* property of x is also one of y. Certain relations which are reflexive, symmetrical, and transitive (like "is superposable on") have been denoted by =, but this was only with reference to all those properties *relative to our discourse*. Cf. also a preceding note on mathematical equality.

when one can *deduce* all the properties of x from the logical relations in question. The two other kinds of definition are (1) the "nominal definition" of x in the form $x=a$, which has already been described, and (2) the "definition by abstraction" of an operation ϕ by saying to what class a it is applicable and, x being an element of a, by establishing which are the y's of a such that $\phi y=\phi x$. This has also been described above.

* * *

Russell[58] urged against the validity of the above process of Peano's of using abstraction as a substitute for definition,[59] the fatal formal defect of not showing that only one object satisfies the definition. Thus, in the definition by abstraction of "powers" or "cardinal numbers," we consider two classes u and v which can be put in a one-one relation[60] with one another, or are equivalent. As equivalence is a reflexive, symmetrical, and transitive relation, Peano and common sense conclude that u and v have a common property, and *vice versa*; this common property we can then define as their cardinal number, so that the equality of the cardinal numbers of u and v consists in the equivalence of u and v. Instead of obtaining *one* common property[61] of similar classes, which is *the* cardinal number of the classes in question, we obtain a *class* of such properties, with no means of deciding how many terms this class contains.[62] In order to make this point clear, let us examine what is

[58] *Op. cit.*, pp. 114-115.

[59] This process of analyzing any reflexive, symmetrical, and transitive relation between the classes u and v into sameness of relation to an entity denoted by ϕu or ϕv to be obtained by abstraction, was called "definition by abstraction" by Burali-Forti in his *Logica Matematica*, published at Milan in 1894.

[60] A relation is one-one when, if x and x' have the relation in question to y, then x and x' are identical; while if x has the relation in question to y and y', then y and y' are identical. A one-one relation whose domains are u and v was denoted by Peano by $fv\phi$ placed partly between and partly after u and v (*Formulario*, 1905, p. 75).

The term "one-one" does not imply that the (as yet undefined) notion of "the number 1" is used in this definition, and such is not the case (cf. Russell, *op. cit.*, pp. 113, 305, and Couturat, *op. cit.*, pp. 31-32, 47-48).

[61] Cf. Cantor's definition by abstraction (1883) in *Zur Lehre vom Transfiniten*, pp. 23-24.

[62] Couturat (*op. cit.*, p. 48) pointed out that this class may, seemingly, be null; "a definition by abstraction shows neither the existence nor the uniqueness of the object defined."

meant in the present instance, by a common property. What is meant is, that any class has to a certain entity, its number, a relation which it has to nothing else, but which all equivalent classes (and no other entities) have to the said number. That is, there is many-one relation wihch every class has to its number and to nothing else. Thus, so far as the definition by abstraction can show, any set of entities to each of which some class has a certain many-one relation, and to one and only one of which any given class has this relation, and which are such that all classes equivalent to a given class have this relation to one and the same entity of the set, appear as the set of numbers, and any entity of this set is *the* number of some class. If then, there are many such sets of entities—and it is easy to prove that there are an infinite number of them—every class will have many numbers, and the definition wholly fails to define *the* number of a class. This argument is perfectly general, and shows that definition by abstraction is never a logically valid process.

The legitimacy of this process of Peano's requires[63] an axiom, namely that, if there is any instance of the relation in question—a transitive, symmetrical and (within its field) reflexive one between u and v—there is such a new entity as ϕu or ϕv such that our relation is analyzed into sameness of relation to the new term ϕu or ϕv. As the entity to be defined should be visible, at least to the mind's eye,[64] this axiom becomes, in the logic of relations, a proposition proved by Russell in his calculus of relations, and called by him "the principle of abstraction."[65] This principle is: "Any symmetrical and transitive relation R, of which there is at least one instance, can be expressed as the relative product of a many-one relation S and its converse, so that S subsists between each of the individuals x, y and a third term z in such a way[66] that xRy is equiv-

[63] Russell, *op. cit.*, p. 220

[64] *Ibid.*, p. 249.

[65] Russell, *op. cit.*, pp. 166-167, 116, 305; Couturat, *op. cit.*, pp. 33, 42-43, 48-50; and Russell's paper: "Sur la logique des relations," *Rev. de Math.*, VII, No. 2, § 1, Prop. 6, 2.

[66] An axiom virtually identical with this principle, but not stated with the necessary precision, or not demonstrated, is, according to Russell (*op. cit.*, p.

alent to the two propositions: $x S z$ and $y S z$. It is this z which is Peano's ϕx or ϕy, and is the common property of x and y;[67] and all mathematical purposes of the supposed common property are completely served when it is replaced by this z. Russell actually constructed such a z by pointing out that the requirements were satisfied by the class of terms having the given relation to a given term.

Thus, if we apply the principle of abstraction to equivalent classes, we arrive[68] at a definition of the cardinal number of u as the class of the classes similar to u.[69]

* * *

The "definition by postulates" also is not a definition.[70] An aggregate of postulates only determines the meaning of the undefined symbols to a certain extent, for the same system of postulates can be verified by many interpretations given to the undefined symbols: a system of postulates is analogous to a system of equations between many unknowns; if our postulates really determine our undefined notions uniquely, a "resolution" with respect to these unknowns results in nominal or explicit definitions. When the system of postulates contains only one primitive idea, it is easy to extract the explicit definition of the latter, for we need only say that it is "such that" it verifies the system of postulates. But it

219n), to be found in a paper by De Morgan, *Camb. Phil. Trans*,. vol. X, p. 345-

[67] The principle, then asserts "that there *are* such entities, if only we know where to look for them" (Russell, *op. cit.*, p. 249).

[68] Russell, *op. cit.*, pp. 115, 304-307.

[69] It then becomes a strictly demonstrable proposition that any class u has a cardinal number. For u itself is a member of the class called the cardinal number of u, since u is similar to itself (equivalence is a reflexive relation) and hence the cardinal is not a null class (Russell, *op. cit.*, p. 305; first given in *Rev. de Math.*, VII, p. 121).

Cf. Frege, *Die Grundlagen der Arithmetik*...., Breslau, 1884, pp. 73-99.

Analogously, a nominal definition of ordinal types as a class of like relations was given by Russell (*op. cit.*, pp. 241, 313; cf. Couturat, *op. cit.*, pp. 76-77).

[70] Couturat, *op. cit.*, pp. 40-42, 57-58; Frege, "Ueber die Grundlagen der Geometrie," *Jahresber. d. deutsch. Math.-Ver.*, Bd. XII, 1903, pp. 319-324; 368-375). Cf. also Russell's criticism of Peano's way of defining finite integers, together with his proofs of Peano's primitive propositions in arithmetic, in *op. cit.*, pp. 124-128.

remains to prove the existence and uniqueness of this notion, as for every other explicit definition.

Every definition is, then, nominal;[71] the "definition by abstraction" is only necessitated by an incomplete logic which does not include a calculus of relations, while the introduction of primitive ideas other than those of logic into arithmetic can, as Russell[72] has shown, be avoided.

* * *

Hilbert later applied the same axiomatic method to the principles of arithmetic, and exposed his results at some length in a lecture *Ueber die Grundlagen der Logik und der Arithmetik* (*Verh. des. 3. internat. Math.-Kongresses in Heidelberg im August, 1904*, pp. 174-185, Leipsic, 1905; translated in *The Monist*, July, 1905, Vol. XV, pp. 338-352). At the beginning of this, he announced complacently that "to-day in researches on the foundations of geometry we are essentially agreed as to the procedures to be adopted." If the procedure is the procedure of Hilbert, in which the essential factor of existence of the object supposed to be defined by the axioms is disregarded, and consequently in which one cannot be sure that one is arguing about anything at all, this is most certainly not the case; in America, for instance, there is the important work on geometry of O. Veblen, who gives chains of axioms for various geometries, but proves the existence-theorems.

Hilbert's view is that there is an essential difference between an examination of the foundations of geometry and one of the foundations of arithmetic, because, in the former case, the mutual compatibility of the axioms can be proved by *arithmetical* constructions, while in the latter case, this is naturally impossible, and "in the founding of arithmetic, the appeal to another basal science seems unallowable." But (cf. on this point M. Pieri, *Sur la compatibilité des axiomes de l'arithmétique, Revue de métaphys. et de morale*, March, 1906, XIV, pp. 196-207) the basal science for arithmetic can be, as Russell's whole work has shown, logic—including the

[71] Russell, *op. cit.*, p. 112; Couturat, *op. cit.*, p. 43.

[72] *Op. cit.*, pp. 8-9, 497-498.

logic of relations, and logic alone is sufficient for the definition of *all* the conceptions of pure mathematics.

What is Hilbert's difficulty in the founding of arithmetic on logic appears from his criticism of Frege—a criticism which applies also to the earlier work of Russell. Hilbert quite correctly observes that "inasmuch as he (Frege), true to his plan, takes....as axiom, that a concept (an aggregate) is defined and immediately available, provided only it be determined for every object, whether it falls under the concept or not, and also in doing this subjects the concept "every" to no restriction [cf. also Cantor, *Math. Ann.*, Bd. XX, 1882, pp. 114-115], he exposes himself to just those paradoxes of the theory of aggregates, which lie, for instance, in the concept of the aggregate of all aggregates [cf. below], and which, it seems to me, show that the conceptions and means of investigation of logic, taken in the usual sense, are not adequate to the rigorous requirements set up by the theory of aggregates." Hilbert's aim, from the very outset, was to avoid such contradictions.

However, though Hilbert develops the conception of the various finite and transfinite numbers in order, and, at each stage, restricts the word *all* to apply only to those entities already introduced, and, by this method, which he has not been the only one to adopt, never gets to Burali-Forti's contradiction; yet he does not seem to me to avoid Russell's contradiction, since "non-existent" means, with him, non-entity, and consequently his "class" of the existent is "the class" of all things.

We will not, in this short account, attempt a detailed criticism of Hilbert's lecture; and will merely remark that the creation by the mind of various "thought-things" governed by certain axioms is, even if such creation is possible, at least unnecessary, for another way, which Frege and Russell had previously followed, is preferable if for no other reason than that Occam's principle is observed (cf. below). As our present object is solely the discrediting of "definitions by postulates," we may merely refer, for other criticisms, to Couturat, *Rev. de métaphys. et de morale*, March, 1906, XIV, pp. 234-235; and Pieri, *ibid.*, p. 200.

null, is always brought about by the actual construction or indication of an individual belonging to the class, and to inquire if an individual "exists" has no meaning.[81] This, now, is the point: mathematicians require a proof of the "existence" of an individual, logicians reply that "existence is a property of classes alone.[82] And the logicians' reply is obviously not satisfactory:[83] it leads one to suspect that there may be individuals, which may be used to prove the existence of classes to which they belong, and which are self-contradictory.

Let us examine a case in which mathematicians have proved what they would call the non-existence of an individual, namely, the self-contradictory nature of a complex number with more than two independent unities which satisfies all the formal laws of ordinary algebra. But we may also express the result of this as: the class of such complex numbers is null, or non-existent, and such a number is not an entity at all. Mathematicians, in fact, have used the word "exists" in two senses: (1) A class exists when we can find a member of it;[84] and (2) an individual does not exist when it is self-contradictory. Logicians use "exists" in the first sense only, for the second sense is merely: a class of such individuals does not "exist," in the first sense. The question is merely a verbal one, the mathematician's usage is confusing, the logician's is not.[85]

What is of great importance in this connection is that, as we shall see in the second part, while we may define the null-class as $x \ni \phi x$, where ϕx is false for every entity x (such as $\phi x =$ "x is not identical with x"), we may also have a non-entity, which may be

[81] Of course, a class (even a null, or non-existent *class*) can be considered as an individual with respect to a class of classes.

[82] Cf. Couturat, *Rev. de métaphys. et de morale*, March, 1906, pp. 232-234; Poincaré, *ibid.*, September, 1906.

[83] Couturat's comments are not always accurately expressed: "On ne démontre pas l'existence d'un individu comme tel. Les individus, par cela même qu'ils sont des individus, sont toujours considerés comme existants; ou plutôt la question ne se pose pas pour eux." To talk of an *existent* individual (even though the epithet obviously was not meant to be taken literally) only increases confusion; the fact is that an entity, if it *is* an entity, is a self-contradictory entity (an entity which is a non-entity).

[84] Cf., for example, Dedekind, *Essays on Number*, 45, 49, 58.

[85] That "exists" in mathematics often means "has being" or "is an entity" is one of the discoveries whose genesis will be described in a later issue.

by a is also one of the things denoted by b.[78] Now the notion of equality, so often used in mathematics, in which not *every* property of a is one of b, but the relation connecting a and b is, like equality, reflexive, symmetrical, and transitive, is always one of the equality as defined above of certain *functions* of a and b. Thus, some geometricians have extended the meaning of equality and have called a (plane and rectilinear) figure a "equal" to a figure b when a is superposable (after dissection, if necessary) on b; this relation of superposability is reflexive, symmetrical, and transitive, and this relation which we may write aSb, can be put into the form $\phi(a)=\phi(b)$ by letting "$\phi(\ )$" stand for "the area of ( )." Similarly, the relation of parallelism (analogous, in many ways, to equality) between two straight lines a and b transforms into an *identity* between certain functions of $=$ the directions of a and b.[79]

It is better to avoid introducing new conceptions unless they are really necessary, and new conceptions of equality are not necessary, and have the disadvantage, further, of rendering confusion possible. The decisive factor is, here as in the question as to whether numbers and other mathematical conceptions are to be defined logically or to be regarded as entities created by our minds, that *entia non sunt multiplicanda praeter necessitatem*, and hence that the problem of first principles is a minimal problem.

VI.

Most mathematicians would say that "existence" is absence of contradiction; whereas we have defined logical (or, what is the same thing, mathematical) existence as an attribute applying to a *class* a which is not null.[80] The proof that a class "exists" or is not

[78] Supposing that properties (propositional functions) determine *classes* in the manner already explained, this may be also put in the form: "$a=b$" means that *every* class which contains the object a also contains b. On Frege's theory that equality is not an identity of names, but expresses an identity of what he calls "denotation" (*Bedeutung*) together with a diversity of "signification" (*Sinn*), see his essay "Ueber Sinn und Bedeutung" in *Zeitsch. für Phil.*, C, 1892. We shall return to this point.

[79] Cf. Frege, *Grundlagen*, pp. 76-77; Couturat, *op. cit.*, p. 49, note; Burali-Forti, "Sur l'égalité, et sur l'introduction des éléments dérivés dans la science," *Enseignement math.*, I, 1899, pp. 246-261, and the above-mentioned *Congrès* paper (pp. 289-307).

[80] Cf. Russell, *Mind*, N. S., XIV, 1905, p. 398.

existence of ω_1 is proved; and $\aleph_1$ is defined to be the cardinal number of terms in a series whose generating relation is of the type ω_1. Hence, we can advance to ω_2 and $\aleph_2$, to ω_ω, and $\aleph_\omega$, and so on. This process gives us a one-one correlation of ordinals with (some) cardinals: it is evident that, by extending the process, we can make each cardinal which can belong to a well-ordered series correspond to one and only one ordinal. Cantor assumed that every class is the field of some well-ordered series, and hence deduced that all cardinals are Alephs.[91] This assumption seemed to Russell unwarranted.

VII.

Another, and rather different, example of the use of this "principle of abstraction" was given by Russell[92] in his definition of a real number. A real number was, as we have seen above, defined by Peano by abstraction: but Russell gave a nominal definition of a real number as a class, which can be proved to be an" existent" class,[93] and which has all the mathematical properties commonly assigned to a real number.

Any class of rational numbers[94] which is not null, which does not comprise all rational numbers,[95] and which comprises all those less than any one of its elements, is called a *segment* of rationals. To each rational r belongs one segment (of rationals less than it),

[91] See below.

[92] *Op. cit.*, pp. 270-286; Couturat, *op. cit.*, pp. 85-89.

[93] It is only by defining a number nominally, and as a class that its "existence" can be proved.

[94] The rational numbers here used are *signless* ratios or *relations* of finite cardinal numbers (see Russell, *op. cit.*, pp. 149-150; Couturat, *op. cit.*, pp. 79-81), or again they may be defined as Frege (*Grundlagen*, pp. 114-115) seemed to have urged, as classes (which can be proved to "exist") of couples. In either case, these rationals must be carefully distinguished from the rationals *with sign* (positive and negative), in the same way that a cardinal number n (a class) is not to be confused with the "positive integer" $+n$ (a relation, see Russell, *op. cit.*, p. 229; Couturat, *op. cit.*, pp. 80, 89). Cf. the distinction carried out between integers, integers with sign, rationals, rationals with sign, and so on, by Peano, with only minor mistakes in his *Formulario de mathematica*, V, 1905, pp. 83, 95-100, etc.

[95] By dropping the first condition alone, we may introduce zero, and, by dropping the second condition alone, we may introduce infinity, as limiting cases of segments (Russell, *op. cit.*, pp. 273-274; Couturat, *op. cit.*, p. 89; cf. Jourdain, *Journ. für Math.*, Bd. CXXVIII, 1905, p. 186).

but not inversely;[96] and, indeed, the class of segments is not capable of a one-one correlation with the class of rationals.

If, now, we confine our attention to those segments which have no rational maximum, or, in other words, the segments (u) such that every term of u is less than some other term of u, and consider those other classes v of rationals such that, if x is any member of u, there is a member of v greater than it, and, if y is any member of v, there is a member of u greater than it. This relation of v to u may be expressed:[97] "v is coherent to u"; and Cantor[98] considered this relation of being coherent (*zusammengehörig*) when, as is sufficient when u is any segment of rationals (of type η), v is a "fundamental" series (of type ω)

$$\omega_1, \omega_2, \ldots, \omega_\nu, \ldots;$$

while the series cannot be of *finite* type if u has no maximum. Another class w (arranged in type $\omega . 2$, for example, or again in type ω), may also be coherent to u, and the relation of being coherent may be proved to be symmetrical and transitive. From this we infer that both v and w have to some third term (the "common property") a relation which neither has to any other term; and this third term may be taken to be the segment u which both define, and thus u is said to be the real number which all classes coherent to u define.[99]

Now there is a difference between the use of the "principle of abstraction" here and its use in defining the cardinal number of a class. Here a class of rationals has the relation of "being coherent to" its real number, there a class had the relation ϵ to its cardinal number. And we may frame a definition of a real number like, in this respect, that of a cardinal number. If a is a class (finite or infinite) of rationals, we may define the real number be-

[96] This fact may be described by saying that there are irrational segments.

[97] Russell, *op. cit.*, p. 274.

[98] *Math. Ann.*, Bd. XLVI, 1895, p. 508.

[99] Peano (*Formulario*, 1905, p. 10) defined a real number $l'u$, the "upper limit of u," where u is a class of rationals, by the abstraction:

$$l'u = l'v \,.=.\, \eta u = \eta v \qquad \text{D}f.,$$

where ηu and ηv are segments. Russell's definition is:

$$l'u = \eta u,$$

which obviously satisfies the above equation, and does not require any new meaning of $=$ besides logical identity (cf. above § 5).

longing to u ($l'u$) as "the class of all those classes which are coherent to u."

We shall find an analogue to these two definitions of real number in the definitions of cardinal and ordinal number which I propose (in what I call my "second theory"), as seeming, for a certain reason, preferable to Russell's though the new definitions are not essential to the theory.[100] With Russell's the relation of a class v to its cardinal number is ϵ, with mine this relation is "is similar to"; and both definitions satisfy the necessary requirements of being nominal and not requiring the re-definition of $=$, which has thus the same meaning (of identity) throughout all logic and mathematics.

[TO BE CONTINUED.]

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[100] This "second theory," in which cardinal numbers are defined, by an extended induction, to be classes of the preceding cardinal numbers, seems necessary if we are to avoid—what we must in what will be referred to as the "limitation-of-size theory"—defining a number as a class equivalent to the class of all classes. However, it must be acknowledged that Russell, by his "no-classes theory," has made such an attempt to improve the older theory superfluous.

CRITICISMS AND DISCUSSIONS.

ODDLY-EVEN MAGIC SQUARES.*

A convenient classification of magic squares is found by recognition of the root as either a prime number or evenly-even, or oddly-even, or oddly-odd. These four classes have many common traits, but owing to some characteristic differences, a universal rule of construction has hitherto seemed unattainable. The oddly-even squares especially, have proved intractable to methods that are readily applicable to the other classes, and it is commonly believed that they are incapable of attaining the high degree of magical character which appears in those others.

Mr. W. S. Andrews, in *Magic Squares and Cubes,* page 183, has indeed presented a remarkable composite 10-square, a quasi 5-square, formed of twenty-five quadrate groups of consecutive terms, that is, a series of progressive 2-squares. That specimen has most of the diagonals correct, and the author ventures a prophecy that the number of such diagonals may in some way be increased. As some extensive explorations, recently made along those lines, have reached a very high latitude, the results will now be presented, showing a plan for giving to this peculiar sort, more than the ordinary magical properties.

Problem: To make oddly-even squares which shall have proper summation in all diagonal and rectangular rows except two, which two shall contain S—1 and S+1 respectively. This problem is solved by the use of auxiliary squares.

If n is an oddly-even root, and the natural series 1, 2, 3 etc. to n^2 is written in current groups of four terms, thus:

1.2.3.4.—5.6.7.8.—9.10.11.12.—13.14.15.16. etc.
0.1.2.3.—0.1.2.3.—0. 1. 2. 3.— 0. 1. 2. 3. etc.

1 5 9 13 etc.

*Diagrams drawn by W. S. Andrews, Schenectady, N. Y.

then from each current group a series 0.1.2.3 may be subtracted, leaving a series 1.5.9.13 etc. to n^2—3, a regular progression of $n^2/4$ terms available for constructing a square whose side is $n/2$. As there are four such series, four such squares, exactly alike, readily made magic by well-known rules, when fitted together around a center, will constitute an oddly-even square possessing the magical character to a high degree. This will serve as the principal auxiliary. Another square of the same size must now be filled with the series 0.1.2.3 repeated $n^2/4$ times. The summation $3n/2$ being always odd, cannot be secured at once in every line, nor equally divided in the half lines, but all diagonal and all rectangular rows, except two of the latter, can be made to sum up correctly. Hence the completed square will show a minimum of imperfection.

In illustration of these general principles, a few examples will be given, beginning properly with the 2-square, smallest of all and first of the oddly-even. This is but an embryo, yet it exhibits in its nucleated cells some germs of the magical character, capable of indefinite expansion and growth, not only in connection with those of its own sort, but also with all the other sorts. Everything being reduced to lowest terms, a very general, if not a universal principle of construction may be discovered here. Proceeding strictly by rule, the series 1.2.3.4. affords only the term 1. repeated four times, and the series 0.1.2.3. taken once. The main auxiliary (Fig. 1) is a genuine quartered 2-square, equal and identical and regular and continuous every way. S=2.

1	1
1	1

Fig. 1.

0	1
2	3

Fig. 2

0	2
3	1

Fig. 3.

0	3
2	1

Fig. 4.

1	2
3	4

Fig. 5.

The second auxiliary (Fig. 2) taking the terms in direct order, has eight lines of summation, showing equality, S=3, in all four diagonals, while the four rectangular rows give inequalities 1.5 and 2.4; an exact balance of values. This second auxiliary may pass through eight reversed, inverted or revolved phases, its semi-magic character being unchanged. Other orders may be employed, as shown in Figs. 3 and 4, bringing equality into horizontal or vertical rows, but not in both directions at the same time. Now any one of these variables may combine with the constant shown in Fig. 1, developing as many as twenty-four different arrangements of the 2-square, one example of which is given in Fig. 5.

It can not become magic unless all its terms are equal; a series whose common difference is reduced to zero. As already suggested, this 2-square plays an important part in the present scheme for producing larger squares, pervading them with its kaleidoscopic changes, and forming, we may say, the very warp and woof of their substance and structure.

The 6-square now claims particular attention. The main auxiliary, Fig. 6, consists of four 3-squares, each containing the series 1.5.9.13 etc. to 33. The 3-square is infantile; it has but one plan of construction; it is indeed regular and can not be otherwise, but it is imperfect. However, in this combination each of the four has a different aspect, reversed or inverted so that the inequalities of partial diagonals exactly balance. With this adjustment of subsquares the 6-square as a whole becomes a perfect quartered square, S=102; it is a quasi 2-square analogous to Fig. 1.

13	33	5	5	33	13
9	17	25	25	17	9
29	1	21	21	1	29
29	1	21	21	1	29
9	17	25	25	17	9
13	33	5	5	33	13

Fig. 6.

0	2	2	0	3	2
3	1	1	3	0	1
0	2	2	0	3	2
3	0	1	3	1	1
0	3	2	0	2	2
3	0	1	3	1	1

Fig. 7.

The four initial terms, 1.1.1.1 symmetrically placed, are now to be regarded as one group, a 2-square scattered into the four quarters; so also with the other groups 5.5.5.5 etc. Lines connecting like terms in each quarter will form squares or other rectangles, a pattern, as shown in Figure 9, with which the second auxiliary must agree. The series 0.1.2.3 is used nine times to form this second square as in Figure 7. There are two conditions: to secure in as many lines as possible the proper summation, and also an adjustment to the pattern of Fig. 6. For in order that the square which is to be produced by combination of the two auxiliaries shall contain all the terms of the original series, 1 to 36, a group 0.1.2.3 of the one must correspond with the group 1.1.1.1 of the other, so as to restore by addition the first current group 1.2.3.4. Another set 0.1.2.3 must coincide with the 5.5.5.5; another with the 9.9.9.9 and so on with all the groups. The auxiliary Fig. 7 meets these conditions. It has all diagonals cor-

rect, and also all rectangular rows, except the 2d and 5th verticals, which sum up respectively 8 and 10.

Consequently, the finished square Fig. 8 shows inequality in the corresponding rows. However, the original series has been restored, the current groups scattered according to the pattern, and although not strictly magic it has the inevitable inequality reduced to a minimum. The faulty verticals can be easily equalized by transposing the 33 and 34 or some other pair of numbers therein, but the four diagonals that pass through the pair will then become incorrect, and however these inequalities may be shifted about they can never be wholly eliminated. It is obvious that many varieties of the finished square having the same properties may be obtained by reversing or revolving either of the auxiliaries, and many more by some other arrangement of the subsquares. It will be observed that in Fig. 6 the group 21 is at the center, and that each 3-square may revolve on its main diagonal, 1 and 25, 9 and 33, 29 and 5 changing places. Now the subsquares may be placed so as to bring

13	35	7	5	36	15
12	18	26	28	17	10
29	3	23	21	4	31
32	1	22	24	2	30
9	20	27	25	19	11
16	33	6	8	34	14

Fig. 8.

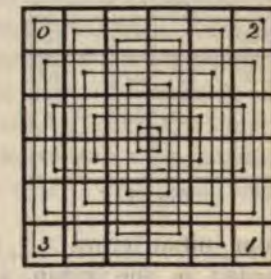

Fig. 9.

either the 5 or the 13 or the 29 group at the center, with two changes in each case. So that there may be $8\times8\times8=512$ variations of this kind. There are other possible arrangements of the subsquares that will preserve the balance of the partial diagonals, but the pattern will be partly rhomboidal and the concentric figures tilted to right and left. These will require special adaptation of the second auxiliary.

We come now to the 10-square, no longer hampered as in the 6-square, by the imperfection of the subsquares. The main auxiliary Fig. 10 consists of four 5-squares, precisely alike, each containing the series 1.5.9 etc. to 97, S=245, in every respect regular and continuous. All four face the same way, but they might have been written right and left, as was *necessary* for the 3-square. The

groups 1.1.1.1, 5.5.5.5 etc. are analogously located, and the pattern consists of equal squares, not concentric but overlapping. The 10-square as a whole is regular and continuous. S=490.

73	29	85	41	17	73	29	85	41	17
45	1	77	33	89	45	1	77	33	89
37	93	49	5	61	37	93	49	5	61
9	65	21	97	53	9	65	21	97	53
81	57	13	69	25	81	57	13	69	25
73	29	85	41	17	73	29	85	41	17
45	1	77	33	89	45	1	77	33	89
37	93	49	5	61	37	93	49	5	61
9	65	21	97	53	9	65	21	97	53
81	57	13	69	25	81	57	13	69	25

Fig. 10.

The second auxiliary Fig. 11 is supposed to have at first the normal arrangement in the top line 0.3.0.0.3.2.2.1.2.2. which would lead to correct results in the rectangular rows, but an alternation of values in all diagonals, 14 or 16. This has been equalized

0	3	1	0	3	2	2	0	2	2
3	0	2	3	0	1	1	3	1	1
0	3	1	0	3	2	2	0	2	2
3	0	2	3	0	1	1	3	1	1
0	3	1	0	3	2	2	0	2	2
3	0	3	3	0	1	1	2	1	1
0	3	0	0	3	2	2	1	2	2
3	0	3	3	0	1	1	2	1	1
0	3	0	0	3	2	2	1	2	2
3	0	3	3	0	1	1	2	1	1

Fig. 11.

by exchange of half the middle columns, right and left, making all the diagonals = 15, but as the portions exchanged are unequal those two columns are unbalanced. The exchange of half columns might have taken place in the 1st and 8th, or in the 2d and 6th, either

the upper or the lower half, or otherwise symmetrically, the same results following.

The resultant square Fig. 12 contains all the original series, 1 to 100; it has the constant S=505 in thirty-eight out of the total of forty rows. When made magic by transposition of 15 and 16, or some other pair of numbers in those affected columns, the four diagonals that pass through such pair must bear the inequality.

73	32	86	41	20	75	31	85	43	19
48	1	79	36	89	46	2	80	34	90
37	96	50	5	64	39	95	49	7	63
12	65	23	100	53	10	66	24	98	54
81	60	14	69	28	83	59	13	71	27
76	29	88	44	17	74	30	87	42	18
45	4	77	33	92	47	3	78	35	91
40	93	52	8	61	38	94	51	6	62
9	68	21	97	56	11	67	22	99	55
84	57	16	72	25	82	58	15	70	26

Fig. 12.

Here, as in the previous example, the object is to give the second auxiliary equal summation in all diagonals at the expense of two verticals, and then to correct the corresponding error of the finished square by exchange of two numbers that differ by unity.

In all cases the main auxiliary is a quartered square, but the second auxiliary is not; hence the completed square cannot have the half lines equal, since S is always an odd number. However, there are some remarkable combinations and progressions. For instance in Fig. 12 the half lines in the top row are 252+253; in the second row 253+252; and so on, alternating all the way down. Also in the top row the alternate numbers 73+86+20+31+43=253 and the 32, 41 etc. of course = 252. The same peculiarity is found in all the rows. Figs. 10 and 11 have similar combinations. Also Figs. 6, 7 and 8. This gives rise to some Nasik progressions. Thus in Fig. 10 from upper left corner by an oblique step one cell to the right and five cells down: 73+29+85+41 etc. ten terms, practically the same as the top row = 490. This progression may be taken right or left, up or down, starting from any cell at pleasure. In Fig. 11 the ten terms will always give the constant S=15 by the

knight's move 2:1 or 1:2 or by the elongated step 3:1. Fig. 12 has not so much of the Nasik property. The oblique step one to the right and five down, 73+29+86+44 etc. ten terms = 505. This progression may start from any cell moving up and down, right and left by a sort of zigzag. The second auxiliary is richest in this Nasik property, the main auxiliary less so, as it is made by the knight's move; and the completed square still less so, as the other two neutralize each other to some extent. A vast number of variations may be obtained in the larger squares, as the subsquares admit of so many different constructive plans.

The examples already presented may serve as models for the larger sizes; these are familiar and easily handled, and they clearly show the rationale of the process. If any one wishes to traverse wider areas and to set down more numbers in rank and file, no further computations are required. The terms 0.1.2.3 are always employed: the series 1.5.9 etc. to 97, and after that 101.105.109 and so on. The principal auxiliary may be made magic by any approved process as elegant and elaborate as desired, the four subsquares being facsimiles. The second auxiliary has for all sizes an arrangement analogous to that already given which may be tabulated as follows:

		top row
6-square,	0 3 0 — 2 2 2	
10-square,	0 3 0 0 3 — 2 2 1 2 2	" "
14-square,	0 3 3 0 0 0 3 — 2 2 2 1 2 2 1	" "
18-square,	0 3 3 3 0 0 0 0 3 — 2 2 2 2 1 2 1 1 2	" "

etc.

The top row being thus written, under each term is placed its complement, and all succeeding rows follow the same rule, so that the 1st, 3d, 5th etc. are the same, and the 4th, 6th, 8th etc. are repetitions of the 2d. This brings all the 0.3 terms on one side and all the 1.2 terms on the opposite. In columns there is a regular alternation of like terms; in horizontals the like terms are mostly consecutive, thus bringing the diagonals more nearly to an equality so that they may be corrected by wholesale at one operation. This systematic and somewhat mechanical arrangement insures correct summation in rows and columns, facilitates the handling of diagonals, and provides automatically for the required pattern of the 2-squares, in which both the auxiliaries and the completed square must agree. In making a square from the table it should be observed that an exchange of half columns is required, either the

upper or the lower half, preferably of the middle columns; but as we have seen in the 10-square, several other points may be found suitable for the exchange.

This plan and process for developing to so high a degree of excellence, the oddly-even squares, starting with the 2-square, and constantly employing its endless combinations, is equally applicable to the evenly-even squares. They do not need it, as there are many well-known, convenient and expeditious methods for their construction. However, in closing we will give a specimen of the 4-square, type of all that class, showing the pervading influence therein of the truly ubiquitous 2-square.

1	5	13	9
13	9	1	5
1	5	13	9
13	9	1	5

Fig. 13.

0	3	0	3
1	2	1	2
3	0	3	0
2	1	2	1

Fig. 14.

1	8	13	12
14	11	2	7
4	5	16	9
15	10	3	6

Fig. 15.

The primaries Figs. 13 and 14 as well as the complete square Fig. 15, singly and together fill the bill with no discount. Each is a quartered square, magic to a high degree. Each contains numerous 2-squares, four being compact in the quarters and five others overlapping. And there are many more variously scattered abroad especially in Fig. 14. While these specimens seem to conform exactly to foregoing rules they were actually made by continuous process using the knight's move 2:1 and 1:2. The pattern is rhomboidal.

In all the combinations here presented, and especially in these last specimens, the 2-square is pervasive and organic. "So we have a symmetry," as one of our philosophical writers has said—"which is astonishing, and might be deemed magical, if it were not a matter of intrinsic necessity."

D. F. SAVAGE.

NOTES ON ODDLY-EVEN MAGIC SQUARES.

The article on oddly-even squares by Mr. D. F. Savage in the current number of *The Monist* is a valuable contribution to the general literature on magic squares. Mr. Savage has not only clearly

described a clever and unique method of constructing oddly-even squares, but he has also lucidly demonstrated the apparent limit of their possible perfection.

The arrangement of concentric quartets of four consecutive numbers in his 6×6 square is strikingly peculiar, and in studying this feature it occurred to the writer that it might be employed in the development of these squares by a direct and continuous process, using the arithmetical series 1 to n^2 taken in groups of four consecutive terms, 1.2.3.4. — 5.6.7.8. etc.

The constructive method used by Mr. Savage is based on the well-known and elegant plan of De la Hire, but the two number series which he has chosen for the first and second auxiliary squares are unusual, if not entirely new. It is difficult to see how these unique squares could have been originally evolved by any other method than that adopted by Mr. Savage, and the different constructive scheme presented herewith must be regarded as only a natural outcome of the study of his original plan. It may also tend to throw a little additional light on the "ubiquitous 2×2 square" and to make somewhat clearer the peculiar features that obtain in these oddly-even squares.

Referring to Fig. 1 (which is a reflected inversion of Fig. 7 in the article by Mr. Savage and therefore requires no further explanation) it will be seen that this square contains nine quadrate groups of the series 0.1.2.3., the numbers in each group being

3	0	1	3	1	1
0	3	2	0	2	2
3	0	1	3	1	1
0	2	2	0	3	2
3	1	1	3	0	1
0	2	2	0	3	2

Fig. 1.

scattered in each of the 3×3 quarters, and in concentric relationship to the 6×6 square. The numbers of these quadrate groups are not, however, distributed in any apparent order as viewed numerically, although the diagram of their constructive forms, which will be referred to later on, reveals the symmetry of their arrangement.

Any middle outside cell of the 3×3 quarters containing a

cypher can be used as a starting point for a 6×6 square, and inspection will show four such cells in Fig. 1.

Selecting the second cell from the left in the upper line to start from, the numbers in the quadrate concentric group of which this cell is a member will be seen to have the formation shown in Fig.

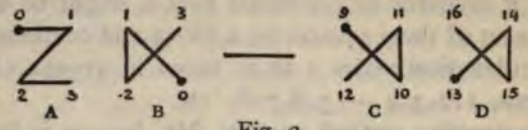

Fig. 2.

2A, so the first group of four numbers (1.2.3.4) in the series 1 to 36 are similarly placed in Fig. 3, running also in the same *relative* numerical order.

To secure magic results in the completed square, each succeeding entry in the 3×3 quarters must follow the last entry in *magic square order.* For the next entry in Fig. 3 there is consequently a choice of two cells. Selecting the lower right-hand corner cell of the 3×3 quarter of Fig. 1 used at the start, it is seen to be occupied by 1, and the formation of the quadrate concentric

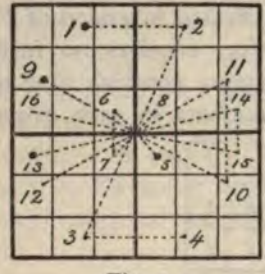

Fig. 3.

32	1	22	24	2	30
9	20	27	25	19	11
16	33	6	8	34	14
13	35	7	5	36	15
12	18	26	28	17	10
29	3	23	21	4	31

Fig. 4.

group is as shown in Fig. 2B. The terms 5.6.7.8. are therefore entered in Fig. 3 in similarly located cells, and as before, in the same relative numerical order. The next quadrate group of 9.10. 11.12 have the order shown in Fig. 2C,—13.14.15.16 are arranged as in Fig. 2D, and so on until all of the 36 cells are filled. The resulting finished square is shown in Fig. 4.

Fig. 5 shows the different forms of the nine consecutive quadrate groups contained in Fig. 4, written in regular order, and it discloses the harmonious relationship of the couplets.

There are two alternative forms for the first group, as shown in Fig. 5. If the square is to be pan-diagonal or continuous at the

expense of the summation of two vertical columns, the right-hand form must be used, but if the square is to be strictly magic at the expense of making four diagonals incorrect, then the left-hand form is correct.

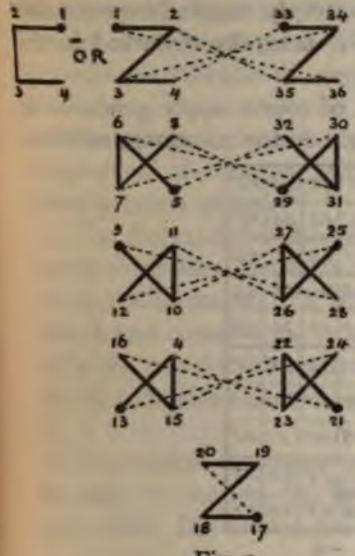

Fig. 5.

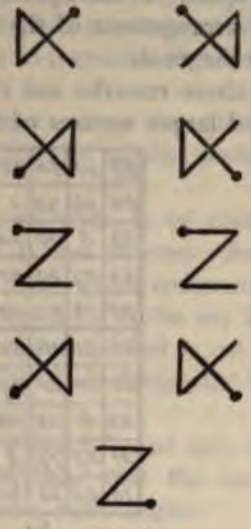

Fig. 6.

This graphic presentation of number order is instructive, as it shows at a glance certain structural peculiarities which are not apparent on the face of the square.

8	25	22	24	26	6
33	20	3	1	19	35
16	9	30	32	10	14
13	11	31	29	12	15
36	18	2	4	17	34
5	27	23	21	28	7

Fig. 7.

Another of the many variants of this 6×6 square may be made by starting from the fourth cell of the second line in Fig. 1, this being also a middle outside cell of a 3×3 square.

Under this change the forms of the quadrate groups are shown in Fig. 6, the resulting square being given in Fig. 7.

When these 6×6 squares are made pan-diagonal, i. e., perfect in all their diagonals, the normal couplets are arranged in harmonic relation throughout the square, the two paired numbers that equal n^2+1 being always located in the same diagonal and equally spaced $n/2$ cells apart. If the square is made strictly magic, however, this harmonic arrangement of the couplets is naturally disturbed in the imperfect diagonals.

The above remarks and rules will of course apply generally to 10×10 and larger squares of this class. A 10×10 square modified

20	41	86	32	73	75	31	85	43	19
89	36	79	1	48	46	2	80	34	90
63	5	50	93	40	39	95	49	7	64
36	97	23	68	9	10	66	24	98	54
25	72	14	59	84	83	57	13	71	27
26	70	16	58	82	81	60	15	69	28
55	99	21	67	11	12	65	22	100	53
62	6	52	94	37	38	96	51	8	61
91	35	77	3	47	45	4	78	33	92
18	44	88	30	74	76	29	87	42	17

+1 −1

Fig. 8.

from Mr. Savage's example to secure the harmonic arrangement of the couplets, as above referred to, is given in Fig. 8.

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BOLYAI, LOBATCHEVSKY, RUSSELL.

In his book on the *Foundations of Mathematics,* Dr. Carus wonders what sort of pistols Bolyai used in the famous duels where, like Ivanhoe, he discomfited the whole series of challengers. But Bolyai was a compound of Saladin and Richard, fighting with a Damascus blade which cut silken cushions or chopped iron. Franz Schmidt told me in Budapesth that his father had seen Bolyai lop off a spike driven into his doorpost, and that some of his duels were to the death.

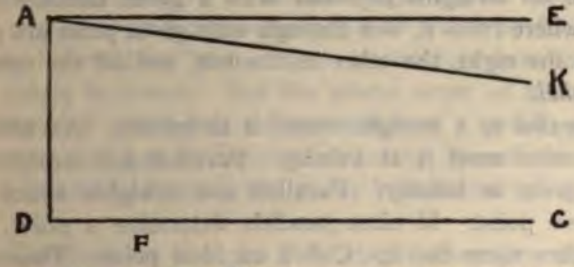
Bolyai published only 24 pages of text, but this is the most extraordinary two dozen pages in the history of human thought. The very first page would kill or cure my genial friend Mr. Russell.

I fear the outcome, since on page 625 of *The Monist*, Vol. XIX, he says: "As to such an idea as that two lines may be parallel if they are taken in the same *sense*, and yet *not* parallel if taken in opposite senses, I fail to find any vestige of it in Lobatchevsky's text. That would be to make Lobatchevsky's system a system of vectors instead of a geometry, and I am sure such a system as well as the idea of a *sensed relation* would put me to permanent intellectual confusion."

The confusion is already here, since vectors assume translation independent of rotation, that is assume the parallel postulate, the whole question at issue.

The Bolyai-Lobatchevsky geometry, then, is of course not a system of vectors, but it is largely a system of *rays*. Bolyai says the ray AB is that half of the straight AB which commences at the point A and contains the point B. Then § 1, "If the ray DC is not cut by the ray AE, situated in the same plane, but is cut by every ray AK comprised in the angle DAE, this is designated by AE||| DC.

It is evident that *there is one such ray* AE, *and only one*, from any point A outside the straight DC, and that the sum of the angles CDA, DAE does not exceed two right angles.



It is also clear that AE|||FC, wherever the point F be taken on the straight DC, supposing in all such cases DC>DF; that is, ray FC of the same sense as ray DC.

Bolyai translates by the word *asymptote* his symbol |||.

To a given ray DC, from a given point A outside it, there is one and only one asymptote AE. Bolyai calls parallel to the straight DC every coplanar straight through A which nowhere cuts the straight DC. So through A, in his terminology, there is only one asymptote to the ray DC, but there may be an infinity of parallels to the straight DC.

Philip Kelland, senior wrangler and tutor to Sylvester, whom

he called the greatest mathematician in the world, was an independent discoverer of the non-Euclidean geometry, and like Bolyai, he called parallel to a given straight all straights coplanar with it which nowhere met it. But this meaning and use of the word parallel has been superseded by Lobatchevsky's. He has no name for this possible infinity of straights through A coplanar with the straight DC but nowhere cutting it. But that one of them which contains the Bolyai asymptote to the ray DC, Lobatchevsky calls parallel to DC and then says "upon the other side of the perpendicular from A will lie also a line AM, parallel to the prolongation DC' of DC, so that under this assumption we must also make a distinction of *sides in parallelism.*"

This *sensed relation* then is Lobatchevsky's parallelism, and that it is a sensed relation, a one-sided relation, a one-way relation, a relation which goes toward one side only is stressed and emphasized by his § 24: "The farther parallel lines are prolonged *on the side of their parallelism,* the more they approach one another." In other words, Lobatchevsky parallels are one-way asymptotes.

So his next theorem, § 25, which tripped Mr. Russell, I might have translated: Two straight lines which are same-way asymptotes to a third are also asymptotes to one another.

So of all straights coplanar with a given horizontal straight which nowhere cross it, two through each given point are parallel to it, one to the right, the other to the left, and all the others I call *ultra-parallel.*

A parallel to a straight meets it at infinity. An ultra-parallel does not even meet it at infinity. Parallels are straights with a common point at infinity. Parallels are straights which meet on a figurative point. If ultra-parallels determine a point, we must have another name for it. Call it an ideal point. Thus equipped, we are able to answer Mr. Russell's question, *Monist,* page 621: "How is the professional expert (the man who knows non-Euclidean geometry) better fitted to see more lucidly in dealing with the elements of geometry than any other person of good geometric faculty?"

Just thus, my dear friend: You say, "I will now spread before the reader in detail what seems to me to be good geometrical proof of my proposition. Consider and refer to the following figure." I do, and instantly, at a glance, I see your fallacy, your *petitio principii.* I am saved the reading of your three pages of pseudo-proof. You assume that an angle is determined in size because it is made by the side with the hypotenuse of an isosceles right-angled

triangle. You say, p. 624: "Now the angle MEN being a w-angle equals the angle $\beta\epsilon\delta\ldots$"; in other words, you assume that the size of the isosceles right triangle has no effect on the size of its acute angles. This is Wallis's form of the parallel postulate. And so you are guilty of begging the question.

Not only would a smattering of Bolyai have saved you but so would a little excursion into Chapter XV of my *Rational Geometry*, which starts by saying: "Deducing spherics from a set of assumptions which give no parallels, *no similar figures*, we get a two-dimensional non-Euclidean geometry, yet one whose results are also part of three-dimensional Euclidean."

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A REMARK ON F. C. RUSSELL'S THEOREM.

F. C. Russell of Chicago has endeavored in the April number of *The Monist* to disprove the legitimacy of the non-Euclidean geometry by showing the demonstrability of the parallel postulate. The basis of his considerations has been laid on a simple proposition that the angle-sum of an isosceles right-angled triangle equals two right angles; a proposition the proof of which he does not dare give, saying it would be "spreading an imputation upon the reader," being so simple in nature. But the whole secret of the matter remained concealed under this unknown sort of a proof, and so we are lucky that we had it imparted to us by Russell himself in a subsequent number. In studying it, we have found all that can be desired.

Russell defines his u-angles "as being such angles as the sides of an isosceles right-angled triangle make with the hypotenuse." This definition is of course not in any way objectionable, but when Russell has to consider the u-angles arising from different triangles of unequal sizes, to be always equal, he has unconsciously fallen into a pit of thought, from which he is unable to get out. When we adhere to the Euclidean world, we can well prove the assumption Russell makes, but how can he protest the legitimacy of it, when he is going to show the Euclidean system to be the sole one that can be relied upon? If he wants to be credited by us, he must first prove the assumption he has made; which most probably he cannot do without having recourse to the parallel postulate or some-

thing else that may be substituted for it. In a word, Russell has substituted a different axiom in place of the postulate of Euclid. His endeavor and achievement have however left nothing that could make a step towards disarming the pan-geometricians. We stand uninjured on the same ground as before in spite of all the desperate assaults from the strong hand of Russell, who has utterly failed to disground us.

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A MATHEMATICAL PARADOX.

The following paradox appears to me to be interesting because it shows how "common sense" breaks down when dealing with a slightly subtle question.

The question to be discussed is: Is the greatest weight that a man can lift the same as the least weight that he cannot lift, or not; and if the weights are different, which is the greater?

The numerical values of all possible weights (both those which the man A can, and those which he cannot, lift at the particular moment considered) form the simply-ordered aggregate of positive real numbers R. Those weights that A can (at this particular time) lift bring about what Dedekind* called a section (*Schnitt*) in R, and all the members of R fall into the two classes:

a. The class of those numbers x such that A can lift the weight x (then also A can lift any of the weights less than x);

b. The class of those numbers y such that A cannot lift the weight y (then also A cannot lift any of the weights greater than y).

Now, as is well known, there is one, and only one, number which "generates" this section, and this number is either the upper limit of the class (a), or the lower limit of the class (b), but not both.

Thus, our answer to the question about the weights is: *Either* there is a greatest weight that a man can lift, *or* there is a least weight that he cannot lift, *but not both*. The paradox lies in the fact that, to unaided common sense, the existence of a limit seems just as, or even more, plausible in both cases or neither as in one

* *Stetigkeit und irrationale Zahlen*, Braunschweig, 1872 and 1892 (English translation in Dedekind's *Essays on the Theory of Number*, Open Court Publishing Co., Chicago, 1901).

only. I cannot see how one is to tell in which case the limit does exist; only that it must in one, and only one, of the two cases.

In my opinion what is paradoxical to the ordinary mind in this is: We have two classes of an infinity of members each (arranged in some order); now ask a person if there is a highest in the first class; if he says "yes" (or "no") he will probably admit by parity of reasoning, that there is (or is not) a lowest in the second.

And yet my case is a translation into picturesque language of an instance well known to modern mathematicians in which the answer *must* be "yes" in the one case and "no" in the other.

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ON THE PROBLEM AND METHOD OF PSYCHOLOGY OF RELIGION.[1]

In a report before the Congress of Psychology at Geneva Prof. Harald Höffding of the University of Copenhagen undertook to sum up his theory of the psychology of religion with, we must admit, an air of easy and careless assurance. In such a delicate investigation we can not say, "I am right"; much less, "You are wrong." I am not writing at all in this spirit, and I recognize in Professor Höffding too great a degree of culture to assume it in him. However, a fear has taken possession of me and I have not succeeded in freeing myself from it. This is the fear lest Professor Höffding does not take into account so much as they deserve certain difficulties which consciousness raises against the dogmatic presuppositions which form its point of departure,—difficulties which I do not pretend have been solved and much less do I pretend to solve them myself, but whose proper comprehension will always be one step forward.

Professor Höffding's entire conception rests upon the postulate which he lays down as most natural, that the psychology of religion is a part of general psychology. However, religion does not lend itself readily to this classification, but if it did it would be so much like other questions, that if a psychology of religion existed, its first claim would be that general psychology forms a part of the psychology of religion. For it is entirely gratuitous and arbitrary to consider "religion as a particular form and a particular direction

[1] Translated from the French of Professor Billia by Lydia G. Robinson.

of psychological life." But what constitutes religion in consciousness is precisely the negation of a particular form and a particular direction. Do you wish to eradicate something from your cognizance of a thing? Explain it by another while forgetting the proper and constitutive element it possesses. Had I not a horror of all psychological Baedekers I would say, "Beware of false generalizations." Yes, I learned at an early date, and I still maintain to-day, that nothing is apprehended except in that which is more general and more common. But there is the general and the generic. That with which we have to deal is the general that is called the universal, that does not exclude the essential, the particular, but includes them. This difficulty does not entirely escape Mr. Höffding who endeavors to save himself by analogy. The objection suggests itself that religion must be cognized by its own experience in order to apply psychology to it. He expects this objection and thinks he can overcome it by saying that in default of this experience the psychologist would be able to conceive religious phenomena while seeking to discover what place religion would occupy in his psychical life if it existed for him, in the same way that he might be able to imagine colors beyond red or violet. For this it would be necessary for him to direct his attention to the place which religion occupies in the psychical life of those who are acquainted with it from their own experience. The question is to define the psychological place of religion in the same way that the geometrical locus of a point is defined in mathematics. But there is no psychological locus and least of all for religion. Religion does not occupy a place in the psychical life but it is the whole. It includes and creates all. When it is anything else, it is either no longer religion or it is not yet religion. Religion is quite a different thing to those who are acquainted with it than to those who do not know it. For instance certain rites, sacraments, prayers, ecstacies, clash too much with so-called reason to be comprehended by an indifferent person as they actually exist in a believer who experiences that actual perception upon which alone religion rests. It is like love. Nothing is more absurd than to see an indifferent person judge or laugh at it; as if the external manifestations were the same thing for the one who experiences the passion as for others, and especially as if the principle from which these manifestations arise is in any way comprehensible except to him who has the experience. It is just such a monstrous absurdity as the attempt to impose upon universal culture a history of philosophy conceived and drawn up apart from all

philosophy. It is because of this, that in the analogy with which Mr. Höffding appears to be content, what is still to be accomplished is given as accomplished. It is because of this that, contrary to the opinion of Mr. Höffding, I think that the historical method has no value for the psychology of religion; that it is very useful as a curiosity but if it takes a place ahead of psychology it only leads it astray and gives it the illusion of describing and cognizing a mental fact while remaining outside of the fact itself, which, especially for a psychologist is too great an evil. In fact it is here indeed that Mr. Höffding takes refuge. The psychology of the savage and the primitive man to which he resorts, following the example of Westermarck, is so comfortable! "Magic," he says, "is a more primitive phenomenon than religion." How does he know? "Religion," he adds, "does not appear until man finds out by experience the insufficiency of his magic power; that is to say, until he perceives his own limitations and his dependence. Hence it is by the path of resignation that the step is taken from magic to religion." Although he raises before our eyes a very imposing "hence," I have heard a gamin murmur, "And who told you so?" I do not deny the rôle which imagination plays. It is very useful in history and becomes an absolute necessity in pre-history. But in this case instead of imaginary experiences we have experiences which are truly experimental; actual experiences established which tell us that it is not by resignation that we reach religion, but it is by religion that we pass from a vain effort and despair to resignation.

One word more. What Professor Höffding has to say about the critical period at which the religious element becomes detached from other forms of the mind is very instructive, but I may be permitted to add that this does not detract from religion but advances it. When the so-called other sides of the spiritual life become detached from religion it is well for religion to be separated from them in order to accentuate its superiority, its spirituality, and essential inwardness.

The fundamental objection which I brought against Professor Höffding is so simple that it is not surprising that in the Congress of Philosophy it should have been heard from several quarters. The result was that by the second session I said no more, because the idea for which I stood had found in the meantime far more able interpreters than I in other speakers, especially M. Lutoslawski. But since I did not stay to the end of the discussion which extended through three or four other extra sessions, I was not aware that

any one else had undertaken to give a trenchant answer to that objection which in my simplicity I considered unanswerable. I have read of it in the report of the Congress published in the *Revue de philosophie* of September, page 430. In replying to M. Rochat, who, almost like myself, refuses to admit that a psychologist deprived of religious sense[2] can study religious phenomena to advantage, M. Bernard Leroy, of l'Ecole des Hautes Etudes, declared that one need not be religious to speak scientifically about religion, any more than he need be mad in order to discuss mental pathology. Profound observation! Astonishing discovery! It deserves my fullest appreciation. Oh, if I had but heard it some years ago! I was once speaking with the greatest unconcern about the self-styled psychiatrists, and with my usual abruptness classed them all in the category of charlatans, and scouted without mercy the pretence of judging the minds and souls of other people, of perceiving from without and of arbitrary classifying mental disease by means of the hastiest inductions, when a young physician of my audience regaled me with the classical classification accepted by the modern schools of sufferers from mental diseases into imbeciles, psycho-neurotics, degenerates, psychotoxics and encephalopathics, with their subdivisions into melancholics, maniacs, etc., etc., in such convincing accents that I was reduced to silence, and came to the conclusion that a man not versed in psychiatry should not attempt to speak of it so lightly. Simpleton that I was! If I had then heard M. Leroy I would have known how to retaliate, and could have answered that it is no more necessary to be a psychiatrist in order to talk about psychiatry, than it is to be a charlatan in order to talk about charlatanry.

Yet the opinions of Professor Höffding and of Mr. Leroy are instructive from another side. They show us the range of a very common view of which we are not always fully aware and which I hope to surpass. The postulate that the psychology of religion is a part of general psychology depends upon the postulate that psychological observation is a part of general observation, which may be divided into the two classes, psychological or internal, and physical or external. One rather cautious party of spiritualists thinks that it has already attained and safeguarded a good strategic position by affirming the distinction between the two kinds of observation

[2] I say "*almost* like myself." As far as I am concerned, what I have said above leaves me no room to admit that a *psychologist* is ever deprived of a religious sense.

and the rights of the psychological in relation to the physical, which, although more precise and more definite, is not the only kind. But this is not enough for me.

What is physical observation if not the observation of luminous, audible, extended,—that is to say, sense-perceptible, phenomena; and what are sense-perceptible phenomena if not perceptions, that is to say, one kind of our psychical states? Physical phenomena, including phenomena of extension, are clearly distinct from psychical phenomena. Yes, but there are not two different observations but only one; psychology is not a kind of observation but observation itself. But I have just shown that psychology is not curiosity but improvement, that one can not observe a fact without producing it,[2] and that psychology is more derived from ethics than ethics from psychology. By giving ourselves this point of view we shall no longer separate the religious character of observation from religiousness. As soon as improvement takes place through internal observation, and the observation is made from a sense of duty, ethics and religion, the loftiest possessions of the soul, will no longer be kinds of activity or kinds of observation, but the very principle of activity and of observation.

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THE PRAGMATIST VIEW OF TRUTH.

A PROBLEM WITHOUT A SOLUTION.[1]

Pragmatism is still agitating the philosophical world, and Prof. William James continues the good fight dealing blows right and left. There is a change only in so far as pragmatism does not seem to spread further, and its ingenious leader now assumes more and more the defensive. His main weapon consists in the declaration that his antagonists have misunderstood him. They are accused of distorting his views into silly absurdities which he did not mean to say, and they are put down with such phrases as, "this is the usual slander" (p. 274).

In our criticisms we have always been careful to quote the

[2] "Has the Psychological Laboratory Proved Helpful?" *Monist*, July, 1909. Compare "La Philosophie c'est l'unité morale, *Bericht d. III. Internat. Congr. für Philosophie, Heidelberg.*

[1] A review of *The Meaning of Truth, A Sequel to Pragmatism*, by William James, New York: Longmans Green & Co. Price $1.25 net.

master's *ipsissima verba*, and so we feel that his complaint is not applicable in our case.

But pragmatism is so subtile that no one appears to be able to appreciate it unless he enters into its spirit with enthusiasm. Professor James says (pp. 183-184):

"The pragmatist question is not only so subtile as to have escaped attention hitherto, but even so subtile, it would seem, that when openly broached now, dogmatists and sceptics alike fail to apprehend it, and deem the pragmatist to be treating of something wholly different."

The difficulty of understanding pragmatism is greatly increased to outsiders, to intellectualists as they are called, to rationalists, to monists, and to the whole crowd of anti-pragmatists, by the brilliant dicta of Professor James, who in his zeal sometimes makes statements which he does not mean and which he offers only as an olive branch to please antagonists or to gain their good will. Professor James says in the preface:

"One of the accusations which I oftenest have had to meet is that of making the truth of our religious beliefs consist in their 'feeling good' to us, and in nothing else. I regret to have given some excuse for this charge, by the unguarded language in which, in the book *Pragmatism*, I spoke of the truth of the belief of certain philosophers in the absolute. Explaining why I do not believe in the absolute myself (page 78), yet finding that it may secure 'moral holidays' to those who need them, and is true in so far forth (if to gain moral holidays be a good), I offered this as a conciliatory olive-branch to my enemies. But they, as is only too common with such offerings, trampled the gift under foot and turned and rent the giver. I had counted too much on their good will—oh for the rarity of Christian charity under the sun! Oh for the rarity of ordinary secular intelligence also!"

Professor James complains about "the rarity of Christian charity" and "the rarity of ordinary secular intelligence." But is he not guilty of the same fault when he misconstrues what other thinkers have said before him; when he censures them in sweeping assertions for mistakes of which only some of them are guilty; when for instance he declares (p. 192) that "throughout the history of philosophy the subject and its object have been treated as absolutely discontinuous entities" (p. 136); while we know that almost every philosopher has considered the two as correlates? If our pragmatists were more familiar with the history of philosophy they would probably not boast so loudly of the originality of the movement, the leading ideas of which are old errors.

We do not doubt that Professor James has been frequently misunderstood, and he confesses himself that he did not always

mean what he said, but it appears that the main reason that he is so much misunderstood is his own carelessness. On page 272 Professor James says with reference to the criticism of Professor Bertrand Russell:

"When, for instance, we say that a true proposition is one the consequences of believing which are good, he assumes us to mean that any one who believes a proposition to be true must first have made out clearly that its consequences *are* good, and that his belief must primarily be in that fact, —an obvious absurdity, for that fact is the deliverance of a new proposition, quite different from the first one and is, moreover, a fact usually very hard to verify, it being 'far easier,' as Mr. Russell justly says, 'to settle the plain question of fact: "Have popes always been infallible?" than to settle the question whether the effects of thinking them infallible are on the whole good.' We affirm nothing as silly as Mr. Russell supposes."

We are glad to know that Professor James does not mean to make the pragmatic result of a belief the test of its truth; but we can not help thinking that his explanations of the meaning of pragmatism go pretty far to justify Professor Russell in thinking so. When we refuse to accept pragmatism we also may be under misapprehension; but if words mean what they say, Professor James believes that science is not possible, or at least that what is called science is not reliable, that new fangled theories have replaced the old orthodox conceptions, that Euclid is antiquated because Bolyai and Lobatchevsky have excogitated other geometrical systems, and that truth and its exponent science have neither stability nor objective significance. We may misunderstand Professor James, but this is what he says on page 57:

"As I understand the pragmatist way of seeing things, it owes its being to the break-down which the last fifty years have brought about in the older notions of scientific truth. 'God geometrizes,' it used to be said; and it was believed that Euclid's elements literally reproduced his geometrizing. There is an eternal and unchangeable 'reason'; and its voice was supposed to reverberate in *Barbara* and *Celarent*. So also of the 'laws of nature,' physical and chemical, so of natural history classifications—all were supposed to be exact and exclusive duplicates of pre-human archetypes buried in the structure of things, to which the spark of divinity hidden in our intellect enables us to penetrate. The anatomy of the world is logical, and its logic is that of a university professor, it was thought. Up to about 1850 almost every one believed that sciences expressed truths that were exact copies of a definite code of non-human realities."

Now we deny that geometricians ever believed that Euclid's Elements "literally reproduced God's geometrizing"; or, what means the same, that geometry is a direct description of objective space-

conditions. All mathematical propositions are purely mental constructions by the aid of which we can calculate the relations that obtain in space, or other conditions, proportions, probabilities, etc., and *mutatis mutandis* the same is true of logical syllogisms and of the laws of nature. None of them are copies or duplicates, or archetypes, but they are formulas by which we comprehend reality and which serve us to adjust our conduct. Here Professor James is guilty of an obvious misunderstanding of the import of science, and he misconstrues the meaning of former thinkers.

While to some extent the pragmatist fights windmills which he takes for giant errors, he takes new fads seriously or exaggerates the importance of new theories, making out that they upset and antiquate all previous science. Professor James continues:[2]

> "The enormously rapid multiplication of theories in these latter days has well-nigh upset the notion of any one of them being a more literally objective kind of thing than another. There are so many geometries, so many logics, so many physical and chemical hypotheses, so many classifications, each one of them good for so much and yet not good for everything, that the notion that even the truest formula may be a human device and not a literal transcript has dawned upon us."

The subjectivity of geometry is also insisted upon on pp. 83 ff. On page 85 we read a sentence which reminds us of Kant. Here Professor James says: "The whole fabric of the *a priori* sciences can thus be treated as a man-made product"; though Kant would say that space is "ideal," which means belonging to the domain of ideas, and we would prefer to say, that the *a priori* is "mental or a mind-made product." How ideal or purely mental constructions can possess objective values I have set forth in my book on *Kant's Prolegomena.*

But in the pragmatist conception everything dwindles down to "purely human habits" (p. 29).

A genuine scientific truth is a formula which describes the essential features of a group of facts. A scientific theory is a tentative explanation of facts. Everybody knows that theories and hypotheses are preliminary and we must always be prepared to surrender them. No scientist will regard the change of a theory as a "breakdown" of the notions of scientific truth, be they old or new, but while theories change, truths remain forever. Those features of facts which remain, the "uniformities of nature" as Clifford called them, those eternalities of existence which make science possible, are not subject to change. They are the *raison d'être* on the

one hand of the cosmic order, and on the other hand of man's rationality.

Professor James calls his new book "The Meaning of Truth," but the reader, with the exception of his most ardent admirers, will not know more about what truth in pragmatism means after having read these latest explanations. Professor James even admits that the very "name 'pragmatism' with its suggestions of action, has been an unfortunate choice" (p. 184), and we at any rate must confess that we are more bewildered than helped. Professor James himself says (p. 215):

"As I look back over what I have written, much of it gives me a queer impression, as if the obvious were set forth so condescendingly that readers might well laugh at my pomposity. It may be, however, that concreteness as radical as ours is not so obvious. The whole originality of pragmatism, the whole point in it, is its use of the concrete way of seeing. It begins with concreteness, and returns and ends with it."

Other philosophers too have proposed to begin with concreteness and to end with concreteness, but the worth of a philosophy consists in the method of dealing with the concreteness of existence; yet this portion is missing in pragmatism.

Professor James overestimates the significance of sentiment and underrates the importance of the intellect. His world-conception might be characterized as a philosophy of mood, of temper, of feeling, of subjectivity, in rebellion against the rigid demands of intellect, of science, of consistency of system. He dislikes theory and system, prefers pluralism to monism, clings to the concrete, and abhors the abstract. Such is the poet's and artist's temperament, which is desirable in literature, in lyric effusions, in paintings, especially in *Stimmungsbildern*, but out of place in science and in a scientific philosophy. Such temperamental expressions are perfectly legitimate, and we enjoy the writings of Professor James as such, but we must demur when he parades his subjectivism as philosophy, indeed as the one philosophy to the exclusion of an objective or a scientific philosophy.

Here is a sample of pragmatic epistemology:

"A feeling feels as a gun shoots. If there be nothing to be felt or hit, they discharge themselves *ins Blaue hinein*. If, however, something starts up opposite them, they no longer simply shoot or feel, they hit and know.

"But with this arises a worse objection than any yet made. We the critics look on and see a real q [quality] and a feeling of q; and because the two resemble each other, we say the one knows the other. But what right have we to say this until we know that the feeling of q means to stand for or represent

which they have become different expressions. He attributes to Paul the great work of having preached the pre-existent Christ and of thus having laid the cornerstone of the system of Christian doctrines. What harm that the Gospel writers have not yet realized this ideal of the God-man, if it can be seen to be founded in the eternal nature of things? Du Bose says, "The Scriptures are not Christianity, but themselves a product of Christianity"—*Soteriology*, p. 20. And whatever discrepancies there may be in the Gospels, they are after all different aspects only of one and the same gospel, and this gospel, viz., the gospel in the Gospels is the precious ideal we should care for; it is the same of which St. Paul rendered later a more complete construction.

Du Bose accepts the doctrine that mankind and every single man is the son of God. He says:

"It is an old and familiar issue among us: Did Jesus Christ find man son of God, or did He make him so?....I shall not so much undertake to decide between these two views as attempt to state the truth of both."

It will be interesting to know what the person of Christ is to a man like Du Bose, and we formulate the question thus: Why is Jesus to him the Christ, the Saviour, the Incarnation of God? His answer is this:

"Jesus Himself in His humanity needed the salvation which all humanity needs. Salvation for Him, as for us demanded that conflict with sin and conquest of sin which was preeminently His experience and His achievement. Salvation for Him as for us was impossible either as a mere fact of nature or as an attainment of His own human will. The power of God unto salvation through faith was necessary for Him as for us, and that power manifested itself in Him, as it must in us, in the perfection of His human obedience unto death, even the death of the cross. Through His own blood He entered into the holiest, having found eternal redemption. That is to say, through the perfect loss or offering up of Himself He eternally found or attained His true Self."

"The joy of truth cannot lie in its individual possession. One cannot think of the enthusiasm of Newton's discovery as a possession and pleasure confined to himself. What was it for him, if it was not for the world? Truth, beauty, goodness are infinite personal possessions too, but they are all so in the degree in which they are shared, and are impossible or valueless as only one's own....The holiness, the righteousness, the eternal life which our Lord had achieved was His own; but, O, to Him how little was it, how much was it not, His own! To have been the Truth, and have the truth that He was denied; to have created righteousness, and have the righteousness rejected; to have been all Love and Goodness realized and manifested, and to be met with hate and requited with evil! The contradiction, the gainsaying of sinners against themselves, against their own souls, was what Jesus had to endure,—why? Because He was their true Self,—all the reason and the meaning and

the justification, all the truth and the beauty and the goodness or good of themselves. Himself alone was not the true self of Jesus; He included all selves in Himself, and suffers, and is crucified and put to shame, or lives anew, rejoices, and is glorified in the whole body and in every member of the humanity that is Himself and His own."

Of salvation Du Bose says that "the term itself gives no hint what it is." He says:

"The word Salvation comes over into the New Testament from the Old, and it comes freighted with many associations which invest it with something of a figurative and poetical character. As, e. g., in 1 Cor. xv, where death is personified as the last of a number of enemies to be overcome and destroyed in the Messianic Salvation. The more external and temporal Salvations of the Old Testament, which familiarized the mind to the great truth of God as Redeemer and Saviour of His people, are generally from personal enemies, as Pharaoh, the heathen, and especially the great world powers which successively oppressed them. The idea of Salvation had finally shaped itself into the definite hope of the Messianic redemption, the expectation of a divine deliverer who should save them from all their enemies. But who and what were these enemies? We may be sure that when we have passed beyond the mere outward figures and symbols of things to the things themselves, when we come to do with that which is Salvation indeed, it shall be from those things which are enemies indeed. And has not humanity its enemies? And what are these in the last analysis but ignorance, and sin, and death! No merely outward enemies are in themselves enemies. Pharaoh was the helper of Israel's redemption as Judas was of our Lord's exaltation. The devil himself is to God's saints a ministering spirit sent forth to minister to the heirs of Salvation. Naught in this universe hurts or can hurt us but what we ourselves are and do. All things work together for our good, save as we ourselves defeat them and are our own enemies. What we need to be saved from is ourselves; and our only Salvation is that death of ourselves which is the life of ourselves. The cross is the only instrument of human Salvation."

Our own incompletion is death and Christ is life. Says Du Bose:

"Now 'as in Adam all die even so in Christ shall all be made alive.' No one can know his New Testament without knowing how universally and consistently our relation to Christ is represented as a being *in Christ*. The Incarnation is not an individual fact limited to our Lord as a man; it is a generic fact including, or intended to include, in Him the whole race of man. I hope to prove and illustrate at length elsewhere the important truth that *all* that He was and did in the body of His particular incarnation He is and does, or is to be and do, in the greater body of His general or generic incarnation; that as He has glorified humanity in His own individual body, so is He to glorify it in the great body of his saints, who are only such as they are in Him and He in them. This mode of representation so pervades the New Testament that we need only to allude to the numerous descriptions of the Church as the Body of Christ—described also as His πλήρωμα, or fulness, 'that which is filled with His presence, power, agency, and riches.'"

Typical of Du Bose's mode of thinking is his explanation of the significance of resurrection. He has nothing to say about the physical event, "the resuscitation of a dead body." True he says nothing against it, but he leaves it alone. His interest is concentrated on its significance.

He says:

"The resurrection, then, means to us so infinitely more than the physical or physiological puzzle of the resuscitation of a dead person, that the acknowledged and perhaps insoluble difficulties involved in that practically do not disturb one who appreciates and measures the spiritual significance and necessity of the fact. Christianity has permitted itself to be so mixed up with and embarrassed by the natural aspects of the case, that it has weakened its grasp upon the true fulness and incontestability of the spiritual truth and proof of the resurrection. For my part, and I think in the interest of spiritual rather than of physical science—though I believe them to be one—I fully share the current prejudice against mere miracle (at any rate as we have been understanding it) as explanation for any phenomenon. I should very much prefer to believe that in what we call the miracles of our Lord, and especially in the momentous fact of the resurrection, there is manifested some higher natural working than we have as yet been able to correlate with what we so far know of nature. I am loath to believe that what I consider the most significant, beneficent, and interpretative event in creation should have been interjected into it as an interference or amendment. But at any rate Christianity, I think, can afford to leave to a lower science what of puzzle there is in reconciling the differing and often seemingly conflicting spheres of the spiritual and the physical in human experience. The problem, for example, of the reconciliation of personal freedom and natural causation will probably never be solved, and yet the facts will forever continue.

"What then, let us recall, is the fuller significance of the resurrection? As the death of Jesus, in its spiritual aspect, was not the fact of a moment but the act of a lifetime, as the cross went with Him from the cradle to the grave, and through every minute of every day—as also, He said, it should accompany us,—so also was the resurrection of our Lord a continuous and unbroken act and fact of His whole life. It was a consistent breaking through or transcending the limitations that bind "all us the rest" in the universal subjection to sin and death. The work of Jesus was the fact of His holiness, and every moment of His holiness was an act of resurrection, inasmuch as it was a raising our common nature out of and above its natural state or activity. The death habitually spoken of in the New Testament, at any rate in its higher teachings, is not a physical event. It may and does involve that too, sooner or later, but even physical death, strictly as such, always presupposes an interior spiritual death. Not, I think, that even St. Paul believes that but for the entrance of sin there would not have been the natural change of death; only that that natural change would not without sin have been the dark thing we now, in consequence of sin, know as death. Rather would it have been a change and an awakening, a second birth into a higher life. Sin is not the cause of death as a natural change, it only makes it death in the unnatural evil and dread of it. So it is only the sting and curse of death. Extract the

sting, remove the curse, and death ceases to be death in its bad sense, and becomes only a release and rest from the sorrows of this world and a blessed entrance upon the activities and joys of another. And that other is not a future world only, but an ever present one. It is the kingdom of God or kingdom of heaven which was established in this world by our Lord's life work in it. It is the kingdom of which He Himself said that no one could see it or enter into it except by a new birth from above, a birth which is potentially the whole of the death to sin and the resurrection to holiness and God."

Du Bose makes a distinction between the terms "real" and "literal," and applies them to his interpretation of the Lord's Supper. He says:

"In speaking of what I have called the literal and real truth of the language of the sacrament, I have, perhaps, failed to make a distinction which ought to be made between the terms *literal* and *real*. 'This is my body,' may express a very real without expressing a literal fact. The doctrine of transubstantiation seems to me to assume that the *real* truth of our Lord's words is inseparable from their *literal* truth. The doctrine of real presence assumes a reality which is separable from mere literalness, and which is not less real and far higher for being so separated. Every *verbum Dei* must *be* what it *means*, but it must be so in the sphere, or order of being, in which it is meant or intended....Our Lord Himself spoke of our continuing to see Him, hear Him, etc.; and we do not doubt that we do so in a very real, although not in a literal, sense."

Further down Du Bose explains his interpretation of the sacrament:

"But still the question remains, What are 'the body and blood of Christ,' which are objectively or divinely given, and subjectively or humanly received, in the Lord's Supper? What is it which under the terms 'body and blood of Christ,' is verily and indeed given and received?....

"If this question is to be answered in the light of the whole New Testament teaching, I think we must say, first, that what is given and received in the Lord's Supper is *Jesus Christ Himself*, as not only our new lives, but our new selves, as the ideal and spiritual self which in every man is to take the place of his actual and carnal self. As once for all, in baptism, we put off ourselves and put on Christ, so, in every communion, we repeat that act. For while in the grace of God, and in our own answering faith, we are once for all passed out of ourselves into Christ, yet in fact we need constantly by the grace of God to be putting off ourselves and putting on Christ. Baptism may be said to correspond to what is now called our justification, and the Holy Communion to our sanctification. The one is the once-for-all identification of us with Christ, and the other is the gradual and progressive identification of us with Christ."

We receive Christ and Christ means the higher life, the life of sacrifice. Du Bose says:

"He imparts to us the powers of the *new humanity* which He has insti-

tuted, by becoming in us the holiness, the righteousness, and the life of God. Secondly, the *flesh and blood* given us in the Holy Communion are flesh broken and blood shed; it is not only humanity, but humanity in sacrifice, brought into covenant with God by sacrifice."

We have in Du Bose's exposition a Christianity which leaves out the literal aspect of the dogma. He neither rejects nor refutes it, nor does he accept it; he simply ignores it and lays all stress upon the significance of Christian ideas. It can not be said that he hollows them out and leaves us the empty shell, for on the contrary, he does not throw away the shell, but opens it and shows us the kernel.

We do not venture to decide what part a Christian philosophy will play in the future. Christians may discover that the same truths which underlie Christianity can be obtained by other means and that ultimately they agree more or less with the wisdom of the sages of all climes and nations. There is an ideal toward which all converge, Zarathustra, Lao-tze, Buddha, and Confucius, and even Mohammed. On the other hand we trust that the critics and enemies of Christianity will gradually learn to judge it not from its shell but its kernel.

Friends of Professor Du Bose at the University of the South in Sewanee, Tennessee, have published a calendar in his honor which contains twelve characteristic passages from his books. They read as follows:

"The Cross is the eternal symbol of selfsacrificing love, and love in which God lost and found Himself in us and in which we lose and find ourselves in God.

"Christianity gives us all things, but it requires of us absolutely all the things which it gives us.

"Nothing can dispense us from the humble and devout use of divine means, except the fact of having through their appointed use as means attained the ends for which they were instituted.

"When you have made the law as high as God Himself, you will want God Himself in you to enable you to fulfil it.

"It is not the receiving, but the showing mercy, not our being forgiven, but our forgiving, that Jesus Christ is concerned about.

"Knowing Jesus Christ is our gospel and being what He is is our salvation.

"We may give ourselves in many ways and in many degrees, but it is never real sacrifice unless its spirit is love and its form is mercy.

"Repentance, if it is repentance at all, must repent of sin as sin and of any and all sin.

"As God sees us, as He has eternally foreseen and purposed us, so has He manifested us to ourselves in Jesus Christ.

"The Son of Man took to Himself no special privilege of birth or wealth or class or office; He stood upon His manhood.

"The pure in heart see men as well as God as they are, and have the sweet reasonableness to deal with them as they should.

"It is not the being loved but the loving with a divine love that is our salvation."

Though Professor Du Bose could not be called a mystic, a careful reader will find many points of resemblance between his mode of approaching theological problems and that of such men as the author of *Theologica Germanica,* Tauler, and Angelus Silesius.

EDITOR.

PSYCHOLOGY MORE THAN A SCIENCE.[1]

Psychology, or the study of the soul, can have its origin only within that very consciousness which is at the same time the object of its investigation. It is for this reason that psychology has been considered a branch of philosophy and has shared the same lot, now honored and now under suspicion, banished. It is a well-known fact that psychology has been banished by rigorous positivism. Perhaps in so doing extreme positivism has been logical without being aware of it.

If by science is understood the classification of facts, and if by facts we mean those perceptible to the external senses only, psychology has no place in science or among facts. A superficial observer would be tempted to attribute the abandonment of psychology to the triumphant taste for natural science. Nothing is farther from the truth than this. It is either a slander or an over-valuation, whichever you wish to regard it.

If materialism is to be approved because it is a system, we could not legitimately derive a system from the taste for and the habit of studying natural facts that are scattered, divergent, and without unity. The process of reducing to a unity, even to what spiritualists and critics consider a false unity, belongs always to the province of metaphysics; it always exceeds the bounds of facts. If on the other hand you say that the exclusion of psychology is to be condemned, nothing is more incorrect than to attribute it to natural science which might easily be accused of confusing psychical with

[1] Address delivered at the sixth International Congress of Psychology, held at Geneva, Switzerland, in August, 1909, and translated from the French of Professor Billia by Lydia G. Robinson.

other facts under the guise of vital phenomena, but not of denying or excluding them. The trained man, whether investigator, student, naturalist or physicist, never dreams of excluding the facts of the soul, one of which is his own study, and another the pleasure which he derives from it; rather does he bring about an absorption of himself in the world which is at the same time an unconscious absorption of the world in his own personality.

Let us consider that it is to the founder of modern physics that we owe the great discovery[2] of the entirely psychical nature of colors, tastes, odors and sounds, which has opened the way for all the progress of the psychology, of the critique, and even of the metaphysics for which the philosophy of our day considers itself indebted to Berkeley, Hume, Descartes and Kant, and which may still advance so far as to assign resistance and extent[3] to the same class, and to recognize their psychical nature. Indeed the exclusion of psychical facts betrays too arbitrary a character to endure; psychology would return to science by right of observation and classification of facts, because sensation, intellection, pleasure, grief, memory, association and consciousness, are facts no less than those which are recognized as such in the organic and physical realm.

All parties seem to gain by this transaction: positivism loses something of its particularism and becomes truly positive in not excluding any facts; spiritualism returns to science with its unique facts and in a very favorable condition to rid itself of the useless burden of metaphysical presuppositions. After all, this is a good method, to deny nothing, to assume nothing; facts, facts, nothing else but facts. Let us not trouble any more about spirit or soul, or the ego, or the beginning, or the end; all this is beyond the sphere of human knowledge and especially of science.

But I have shown elsewhere that this position can not be sustained and that the conception is inconceivable.[4] Consciousness and the ego are not hypotheses, nor are they the verbal consequences of psychical acts, but rather the condition of those acts. Psychical acts do not exist except in consciousness and they are not conceiv-

[2] I have already stated elsewhere that I would not dare either to affirm or deny but that some philosopher of antiquity had an insight into this truth; perhaps Plato, especially in some part of the Theaetetus.

[3] I tried to do this in a critical analysis of the very admirable essay on *La Matière*, ("Matter") by the late Ernest Neville. This memoir is an extract from the reports of the Academy of Moral and Political Science.

[4] In my address before the Congress of Psychology at Rome, "L'Oggetto Della Psicologia," which has also been translated into French by Professor Beurtier and published in the *Revue de Philosophie*.

able nor can they be verified except in the self and as the acts of a conscious mind. It is not sensation which produces association, but sensation is an association. And it is not association which produces consciousness and the illusion called self; but it is consciousness, it is the self which makes the association. From this follows the irrefutable conclusion, that internal observation is not simply the principal means but the only instrument, the only source of psychology, and that the method of psychological laboratories, in spite of their excellent intentions and of their serious investigations, rests upon a fundamental misunderstanding and an insurmountable contradiction: namely, that the mind and mental facts must be studied in a place where they are not present, and can not be.[5] I based my thesis upon one observation, among others, which now leads me still further, that is to say to the conclusion reached in this paper.

All the other sciences have for their object things which can be observed and which do not suffer any change by being studied. Psychology, on the contrary, changes its own object at every instant and this object is ourselves. Here is a greater difference between psychology and the other sciences, a more fundamental discrepancy, than could be found between any of the other sciences. Geology for instance makes a study of soils, but it does not produce them; psychology not only studies sentiments, affections and moral uplift, but is itself a sentiment; it is itself affection and moral uplift. A glance thrown upon the facts of the soul does not leave these facts the same as they were before: if I perceive that I am ignorant I am no longer so ignorant as I was; if I perceive that I am sinful I would usually commence to improve myself; if I perceive that I have become the toy of passion, that passion then begins to lose its domination; when a people perceives that it is not free it takes one step towards becoming so in recognizing that it is its duty to be free.

Again, the other sciences do not modify us or change us in any particular; while on the other hand we can not study sentiments without arousing them, cultivating them and changing ourselves completely. The objection may be raised that every sort of study, and every additional piece of knowledge changes us and modifies us in so far that we were ignorant before acquiring it and afterwards have become informed to that extent. Thus far one might

[5] This is the subject of my lecture at Heidelberg, *A quoi servent les laboratoires de psychologie?* translated by Lydia G. Robinson and published in *The Monist* of July, 1909, with slight revision, under the title, "Has the Psychological Laboratory Proved Helpful?"

say that all the sciences participate in psychology, rather than to say that psychology is like the other sciences. But the effect is not really the same. If I observe, consider and comprehend a series of numbers, let us say from 7 to 27, at each number I remain almost in the same condition; the change in myself is not proportional to the number of ideas received. On the other hand, if I not only name twenty shades of sentiment, but if I should study them attentively; for instance, love, hate, desire, austerity, joy or bitterness, compassion or hardness of heart, selfishness or devotion, I would myself indeed pass through the twenty shades of sentiment and even more; I myself would become the twenty good things or evil. In the other sciences the personality is forgotten; it is necessary to forget oneself. But in psychology one enters more and more within himself, and this in an active way or in such a way that he knows no alternative, and he does not act at all without being conscious of it. All psychology lies in this, and it is inconceivable in any other way. Hence the fundamental opposition between psychology and the other sciences; hence psychology is something more than a science, it is life, and in this lies its responsibility. The other sciences teach and enlighten us, psychology is ourselves. And just as we are not simple objects of curiosity such as rocks, or the feet of insects, or Niagara Falls, but a will which must perform a duty, and as that duty is fundamentally the uplift of our feelings and of our entire nature; so psychology is not only a simple observation, nor can it be simply the observation of all feeling; but it is careful, scrupulous choice and perfection itself.

People often speak of the applications of psychology; perhaps in doing so they underrate it. Psychology contains its own applications. Every glance which the mind directs upon itself is at the same time both theory and practice. There is no such thing as pedagogy, there is only psychology. We have no certain way to control the feelings of others, even of little children. Those who feel most sure of an infallible result end by accomplishing nothing at all, or else an effect contrary to the one they wish. It is certainly a paradox that the measure of an educator is not what he succeeds in making of his pupils but in what he is himself. An educator is not bound to make others good. The theory and art of education consists in arousing in one's self, and then cultivating and perfecting the kindliest and most generous feelings for children and for everyone, and directing to the service of this good feeling the classification of ideas, the sum total of one's knowledge, and the mastery

of one's self. It is said of some teacher that he has such a way of doing, of managing, of explaining, that he wins others to him, that he helps them, that he makes them understand and makes them love him. Very good, but what is all that if not his own quality? Let us consider the immense weight of an expression very common in all the countries of continental Europe. When they want to exhort a man to be on his good behavior, to give up his vices, and to conquer his passions, they say simply, "Come (or return) to yourself." In employing this strong expression they do not mean the sophistical pride of the man who wishes it understood that he himself is the moral law; but they merely mean to acknowledge that the revelation of moral law as well as every effort to execute it, to correct one's evil inclination or to advance in the path of good, lies simply in an act of reflection, of concentration and of self-examination; that it is not in books, much less in statistical tables, that our law may be found, but within ourselves.

And if this is true of every meditation and every examination of conscience, if it is true of the first steps of consciousness, what a mistake it would be not to recognize that it is still more true of the regular and constant application of the mind to the study of itself, which is called psychology? And that psychology is indeed something different and higher than any other science, for it is the habitual practice of this application together with the transformation and uplift which follows? That it is not only a fact of ethics but its true actualization?

When learning the elements of mental science it is necessary and very useful to first distinguish and clearly establish the existence, the nature, the degrees, and the kinds of sentiments and emotions, and afterwards their moral value. Before the statement is made that such or such a sentiment exists it must be defined, and not until then should it be judged as to whether it is good or bad, whether or not it responds to the ideal of morality, of justice and of perfection. Indeed there is nothing less easy than to confine oneself to this order of procedure, to guard oneself from confusing at first sight the moral consideration, the valuation from the moral point of view, with what ought to be the purely psychological description. But we can not be severe with regard to this confusion and premature synthesis. It is according to the nature of things that moral valuation is not only important from the practical point of view, but it is an integral part of existence and of the nature of psychical facts. Such a sentiment as love for one's neighbor, filial

affection and love of justice, exists and can be comprehended only in relation to, and dependent upon, its moral value. Psychology, the science of consciousness, should acquire a high consciousness of itself. This would not be only an elegant detail in the department of erudition but an actual ennoblement of the mind and of humanity. When psychology shall have advanced to the true and complete idea of itself it will raise to the loftiest heights all culture and life. Even ethics will gain thereby. Abandoned forever will be the petty etymological peripatetic conception that ethics is the science of customs. As soon as people comprehend that the mind is everything and that everything is in the mind, that the mind is not a means but an end, is not a part of a certain totality, but what has hitherto been conceived as the all is only an effect and a part of mind; we will comprehend that there is no goodness outside of the mind, and we shall easily come to recognize in ethics the science of character and of duty. Every question, every social and political problem should be solved in view of the rights and the finality of the mind. Government, property and customs will be for the mind. The mind has too long been subordinated to its own creations.

L. MICHELANGELO BILLIA.

TURIN, ITALY.

NON-ARISTOTELIAN LOGIC.

Mr. Charles S. S. Peirce adds the following explanation to his comment on non-Aristotelian logic, published on page 45 of the present number of *The Monist*.

"It does not seem to me to have been a lunatic study. On the contrary, perhaps if I had pursued it further, it might have drawn my attention to features of logic that had been overlooked. However, I came to the conclusion that it was not worth my while to pursue that line of thought further. In order to show what sort of false hypotheses they were that I traced out to their consequences, I will mention that one of them was that instead of the form of necessary inference being, as it is, that from A being in a certain relation to B, and B in the same relation to C, it necessarily follows that A is in the same relation to C, I supposed, in one case, that the nature of Reason were such that the fundamental form of inference was, A is in a certain relation to B and B in the same relation to C, whence it necessarily follows that C is in the same relation to A; and I followed out various other similar modifications of logic."

We deny "that from A being in a certain relation to B, and B in the same relation to C, it necessarily follows that A is in the

same relation to C." The statement is not a necessary inference according to the established rules of logic, nor could it be considered Aristotelian.

If A stands in the relation of cousin to B, and B stands in the same relation to C, it does *not* necessarily follow that A is a cousin to C. Or take another instance. If A has a relation to B such as lying 5 feet below B, and B has the same relation to C, it does not follow that A lies 5 feet below C.

We do not venture to discuss the non-Aristotelian substitute, because we are not sure to have grasped the meaning which Mr. Peirce intends to convey.

We will further add that we never used the word "lunatic" in connection with non-Aristotelian logic, nor would we say that it will not be "worth looking into" the theory of a non-Aristotelian logic "notwithstanding its falsity." P. C.

BOOK REVIEWS AND NOTES.

DIE SELEKTIONSTHEORIE; Eine Untersuchung. Von *August Weismann.* Jena: Fischer, 1909. 1 colored plate. Pp. 69.

Professor Weismann's sense of the significance of the theory of selection, as expressed in his contribution to the Darwin centennial memorial prepared by Cambridge University (*Darwin and Modern Science*) is the same as it has been throughout the fifty years of his labors in biological lines, and he himself says that he would never have thought that there could be anything to-day to add on the subject. It was not until he was engaged upon this tribute to Darwin, and even after it was sent to England, that he came to the conclusion that this theory could be established even more firmly than heretofore, that not only can the reality of the selective processes in nature be made to seem in the highest degree probable, as he had hitherto thought, but that they could be actually demonstrated. In his preface Weismann goes on to say: "The logical justification was of course sufficiently sure. When once the hypotheses were granted everything else followed naturally as in a mathematical calculation. But the hypotheses could not always be established. It could not always be demonstrated that the first and smallest beginnings of the countless adaptations which were observed in organisms could be of advantage to their possessor, of such advantage, that is to say, that it could be designated as "worthy of selection"; advantages therefore upon the possession of which depended the life and death of their possessor, at any rate its survival in its posterity. Not until I was thinking over what I had written for the Darwin memorial volume did it occur to me that there are cases in which the value for selection of the stages in the origin and descent of the natural processes of selection lies clearly before our eyes, cases which at the same time decide the question with regard to the reality of such processes....To be sure probability was very strongly on the side of the selection theory even without a formal demonstration. But we know indeed how many considerations and doubts, yea how many of the most highly valued judgments in our own days have repeatedly passed selection by as a "nurse's tale." At any rate certainty is always preferable to even a high degree of probability." The present pamphlet presents Weismann's original essay unchanged, except that it includes the insertion of a few pages which have reference to the new particulars of which he speaks in the above quoted sentences.

M. Théodule Ribot has published a new book on the problems of affective psychology (*Problèmes de psychologie affective,* Paris: Alcan, 1910; price, 2 fr. 50). Some of the essays here collected have been published before, but have been completed by incorporating the results of the author's more recent labors. The first essay discusses the psychology of sentiments in general. The others treat of the emotional aspect of memory, antipathy, pleasure and illusion.

Günther Jacoby, lecturer of philosophy at the University of Greifswald, has written a treatise on pragmatism, (*Der Pragmatismus,* Leipsic, Dürr, 1909) in which he speaks of the new movement very appreciatively. He supports the position of Prof. William James, and endorses his new conception of truth. He looks upon pragmatism as a movement which strikes out on new paths.

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THE MONIST

MOSES.*

ALL that is great and significant in humanity is accomplished by great and significant personalities. To be sure we have been warned against exaggerated personality worship or hero worship, and have been told that the so-called great men are nothing but the exponents of mighty currents and tendencies of their time. In this thought lies a certain truth, in so far as great men do not fall from heaven but require some connecting links: the time must be ripe for them, must to some extent have need of them, and on closer inspection we will usually discover that the currents and tendencies of their contemporaries have met them half way; but that these currents attained their aim, that these tendencies were actualized, is solely and simply due to the merit of the great men themselves, and therefore has earned for them the gratitude of humanity and of history which associates these events with their names.

What is thus true in general of all great men and significant human affairs is also very especially true of religion. For religion is life, the most personal life. It lives only in personalities and through personalities. All great and important events in the history of religion are ineradicably connected with the names of particularly favored

*A lecture delivered at Breslau, October 19, 1908, as the first of a series of lectures on the four great founders of the world-religions. Translated from the German by Lydia G. Robinson.

personages who appeared to their contemporaries as prophets and apostles of God, who had himself taken possession of them and had become a living power within them.

Among these the founders of religion naturally stand in the first rank. They created something entirely new and consciously strove to lead their contemporaries on new religious paths and to bring them a divine truth which had previously been hidden from them. And as founders of world religions, Moses, Buddha, Mohammed and Jesus stand in the first rank.

The earliest of them is Moses. To him we stand in a very different relation from that in which we stand to Buddha or Mohammed. The latter men do not concern us directly and at best can have for us only a scientific objective interest. We are much more likely to see in them enemies and opponents of our Christian religion, its most dangerous rivals in the competition for the spiritual dominion of the world, while Moses and Jesus are in our minds inseparably connected. In Moses we see a direct predecessor of Jesus,—the point of departure of the great religious movement which has found its historical conclusion and spiritual perfection in Jesus. Sufficient reason to devote to this man our particular attention, and indeed our task of sketching him and his work is an especially fascinating and alluring one which will yield a rich reward.

Unfortunately, however, the undertaking is at the same time a very difficult one, and I must express myself with regard to it openly and without reservation. The difficulty lies in the nature of the sources at our command. Buddha and Mohammed stand before us in the full light of history in spite of the great amount of legendary material which attaches to their personalities. We can not say the same of Moses. But have we not the five books of Moses? Could we wish more or better material? It is only the German Bible that knows anything of the "Five

Books of Moses." The Hebrew, Greek, Latin and even the English Bibles do not ascribe these books expressly and directly to Moses. And in the last century and a half, science has worked so vigorously and persistently on just this so-called Pentateuch, that we are justified in speaking here of positive results.

The Pentateuch originated from the combination of various original documents, the oldest of which is perhaps half a millennium later than Moses, so that accordingly the earliest narratives of Moses and accounts of his work which have come down to us are further removed from him in time than we to-day are from Luther. But the Pentateuch, to be sure, contains not only narratives, but laws as well. Is it not possible that one or another of these legal constituents proceeded from Moses himself? In historical tradition he is, of course, the law-giver *par excellence*! When it comes to an estimate of Moses's value for the history of religion, I must express myself frankly and honestly and must also substantiate statements which will probably seem most surprising to many of my readers.

It is my firm conviction that the science of Old Testament criticism of the last generation not only asserts but proves—proves positively, that the great coherent priestly code of the Pentateuch as it has found its characteristic stamp in the code of the tabernacle and in the so-called third book of Moses (Leviticus), is quite late, and does not belong at the beginning of the development as its foundation, but at the end as its culmination. That the coherent code presented in the so-called fifth book of Moses (Deuteronomy) originated in the seventh century was proved by De Wette as early as 1805, and this knowledge has become the common property of Old Testament science. We may leave out of consideration the three poetical pieces ascribed to Moses, his Song (Deut. xxxii. 1-43), his Blessing (Deut. xxxiii), and his Prayer (Psalm xc). Hence there are

only a few pieces of legal import which come seriously into question. These are the so-called Book of the Covenant (Exodus xxi-xxiii) and the Decalogue, or Decalogues, and both are to be found in the earliest original documents.

The Book of the Covenant is old beyond any doubt. It is the earliest attempt in Israel at a detailed formulation of law, and it has acquired a particular significance by the fact that it is this very code which shows most striking parallels to the famous codex, found in 1902, of the Babylonian king Hammurabi who dates back almost a thousand years earlier than Moses. But each closer investigation of the Book of the Covenant makes it more impossible to assume that Moses himself was its author. The work and legislation of Moses were intended for nomadic hordes which were yet to become a nation for the first time, and in whom we may not assume a settled state of civilization founded on agriculture. The whole legislation of the Covenant, however, is calculated for a settled agricultural population, to some extent also engaged in commerce and living under a sort of juridical administration. In the first place, the very detailed regulations about goring cattle are significant. In the Semitic Orient, cattle never and nowhere belong to nomad tribes but are exclusively domestic and farm animals; Semitic nomads raise only sheep and goats. Laws like those regarding injuries to field and vineyards from unrestrained cattle or the ravages of fire, or that fields, vineyards and olive groves should not be tilled the seventh year but should be left to the poor, have not Sinai for a background or the deserts of Kadesh, but the fertile land of Palestine. Then, too, when a regulation requires that the doer of a bodily injury which does not prove fatal must pay the injured one for the time he is bedridden, and also the cost of his recovery, we have a condition of society in which the daily wage can be calculated

in money, and in which professional physicians practise for money, which could never be the social condition of a nomad people even if it were no longer purely nomad but had already advanced to the most primitive agricultural stages. The Book of the Covenant was certainly drawn up at a comparatively early date. In it we can see the codification of customs in practice in the time of the earliest kings in the manner of the oldest German *Weisthümer*; but Moses can not have given his contemporaries such a legislation.

We now come to the Decalogue, the Ten Commandments, in which we see the work which belongs peculiarly to Moses, and which occurs first to our minds when the name of Moses is mentioned. Because of the importance of the matter, I must here enter more into detail. It is first of all noteworthy that this Decalogue has left behind no traces whatever in the early and oldest literature. The earliest passage to be taken into account is in Hosea who says of his contemporaries that they swear, lie, kill, steal and commit adultery (Hosea iv. 2). But the prophet uses other words than those in the Decalogue, and furthermore the order of the sins is entirely different, so that this passage at least *need* not have reference to the Decalogue.

Moreover, it is well known that the Decalogue occurs twice in the Pentateuch in different forms (Exodus xx and Deut. v). The first, for instance, alleges as a reason for resting on the Sabbath, the rest of God on the seventh day after the six days employed in creating the world; the other, consideration for servants, in order that thy manservant and thy maidservant may rest as well as thou (Deut. v. 14). Of course this difficulty is not insurmountable, for on two stone tablets we must think of the ten commandments as formulated in lapidary briefness, perhaps as follows:

"Thou shalt have none other gods before me.

"Thou shalt not make thee any image or any likeness.
"Thou shalt not misuse the name of God.
"Thou shalt keep the Sabbath holy.
"Thou shalt honor father and mother."

But the gravest essential considerations arise against the possibility that even such a nucleus has come down directly from Moses. The Sabbath command and the image prohibition contain insurmountable difficulties. The Biblical celebration of the Sabbath consists everywhere in rest and cessation from labor. It has therefore been designated as a rest offering. But as a matter of fact, such a cessation from work is actually possible only for agriculturists and never for nomads; for the work which the nomad has to perform can not be set aside at will. The cattle must be fed and watered, gathered together and milked on Sunday or holiday as well as on a workday. To attest this fact I will call no less a witness than Jesus, who says in the Gospel of Luke (xiii. 15): "Thou hypocrite, doth not each one of you on the sabbath loose his ox or his ass from the stall, and lead him away to watering?" in which the impossibility of carrying out the Sabbath command for the stock raiser is directly admitted. It is indirectly admitted in the fact that Mohammed, who otherwise borrowed everything from Judaism, did not adopt the Sabbath, because, opportunist that he was, he said to himself that the institution was not suited to his Arabians. In its Biblical sense the Sabbath command is absolutely impossible as a fundamental law of a nomadic people. At the most Moses may have arranged some sort of a religious celebration for every seventh day. The suggestion which has been lately raised that the Sabbath in ancient Israel did not mean the seventh day and a rest day for every week, but the full moon in opposition to the new moon would overcome this objection, but its foundation is very insecure and its maintenance would develop immense difficulties.

In the same way, facts,—undeniable historical facts,—make it impossible to adhere to the image prohibition as Mosaic and as a fundamental command of the religion of Israel. In Dan, where as in Bethel calf worship was carried on officially, which later the prophets struggled against and denounced, a race of priests officiated, which were descended from a grandson of the founder Moses; hence a direct descendant of Moses became the official priest of the Golden Calf! How could that be possible when every child of Israel (modernly speaking) in the Sunday school must know that Moses pronounced as his second commandment for Israel, "Thou shalt not make unto thee any graven image or any likeness"? Yes, a notorious idol has even been traced back in all naïveté to Moses himself. In the temple at Jerusalem at the time of the prophet Isaiah there was still a brazen serpent to which the Children of Israel offered sacrifices. Therefore it was not merely an historical relic from the years in the wilderness, but a representation of deity, which Moses was said to have wrought, and which King Hezekiah caused to be broken in pieces (2 Kings xviii. 4). These are undeniable facts reported in the Old Testament itself.

Further we must consider that we have no polemic from Elijah and Elisha against the calves of Dan and Bethel. If they showed zeal for the God of Israel against the Tyrian Baal, they also showed zeal for the golden calves as the official form at that time of the worship of God in the kingdom of Israel. Even the prophet Amos who appeared in the midst of Bethel and occupied himself in great detail with the cult there, finds no word of complaint for the Golden Calf there. Hosea who stigmatized that ancient and revered symbol by the disrespectful expression, "calf," was the first to engage in polemics against this and every image and symbolical kind of worship, but simply from reasons of good sense, and without any implication that it

was a great sin which Moses had already forbidden. All of this would be absolutely impossible if the Decalogue of Exodus xx had been known to every Israelite as a fundamental command of the religion of Moses and was generally current as such. But if two of the ten commandments are essentially untenable then the whole becomes untenable.

And to make the question still more involved, we have a second Decalogue in Exodus, an entirely different one which likewise was given to Moses on Sinai and reads as follows: (Exodus xxxiv. 14-26):

"Thou shalt worship no other god....
"Thou shalt make thee no molten gods.
"The feast of unleavened bread shalt thou keep....
"Every firstling is mine.....
"Thou shalt observe the feast of weeks....
"Thou shalt observe the feast of ingathering....
"Thou shalt not offer the blood of my sacrifice with leaven;
"The fat of my sacrifice shall not remain until the morning.
"The first of the firstfruits of thy land thou shalt bring...
"Thou shalt not seethe a kid in his mother's milk."

These are the ten commandments on the basis of which, according to the oldest narrators, the so-called Yahvists, the covenant on Sinai was confirmed. In spite of the fact that the two first commandments are essentially identical, it is quite impossible to refer both Decalogues to one original form. This Decalogue of the Yahvist redaction characteristically contains no ethical prescriptions whatever except such as pertain to the religious service; and accordingly it finds the essence of religion in worship. Our own familiar Decalogue bears the relation to this one that Amos bears to his contemporaries.

We must also grant that the tradition that Moses had

made the covenant of Sinai on the basis of ten commandments is very old, but the commandments themselves are missing; for even the Decalogue of Ex. xxxiv can not have been formulated by Moses since it also rests upon the assumption of agriculture and festivals founded upon agricultural customs,—and if we are honest Moses loses nothing by our refusing to ascribe to him this Decalogue. If he had actually established the religion of Israel upon this foundation he would not belong to the greatest religious heroes of mankind.

Accordingly, then, the result of our investigation, which may perhaps seem destructive, is that we have no documents or authentic sayings of Moses, likewise no accounts of him which are even approximately contemporary. Under such circumstances can we dare after all to give a history of Moses and his work? But softly! If we have no historical documents in the usual sense we still have documents from Moses in a higher sense, not written on crumbling stone or moldering parchment, but in living men, as we might say with the Apostle Paul (2 Cor. iii. 3), "Not with ink, but with the Spirit of the living God; not in tables of stone but in fleshy tables of the heart."

Upon the character and history of the people of Israel his work has left such lasting and unmistakable traces, and tradition has retained for us such a great number of highly significant unimpeachable facts that we need be in no doubt. To be sure, documents of this kind, not written with ink, are not always easy to read, and I shall surely not be misunderstood if I often express myself with a certain hesitation; but we shall and can enter upon our task comforted, —yes, I flatter myself, that my readers will feel even especial confidence in a representation of the work of Moses given from a standpoint which they will probably consider very radical, because they have the impression that the author has carefully guarded himself from every incidental

illusion and has avoided every possible source of error in every way practicable.

There is an additional point which lightens our task with regard to Moses; and that is the peculiar double position which he shares with Mohammed only of all the great founders of religions, namely that his is a personality belonging to profane history as well as to the history of religion; he not only founded the Israelitish religion but he also created the Israelitish nation. In his own mind the two sides of his work could not be separated, for in the rôle of prophet he exercised his political activity, as we would call it, in the name of his God as His representative with a definite mission; of this tradition leaves us in no doubt, and in this particular it has certainly drawn his likeness with great accuracy. But we can consider historical facts apart from their religious character and motives, and it is easier to gain a picture of historical than of religious facts. For instance, we can establish the historical facts of the crusades without regard to the religious character and the religious roots of the movement. If we do so we shall obtain only a one-sided picture of them, nor can we have a complete and accurate picture until we have established these historical facts objectively. According to my firm conviction it is also possible to establish the historical facts of the life and work of Moses objectively, and this must be our first task.

In the pages of profane history Moses stands before our eyes as the liberator of his people from Egyptian bondage and as their leader and ruler in peace and war. The Biblical accounts with regard to the fate of the fathers of Israel in pre-Mosaic times permit of the sharpest critique and become the more brilliantly verified according as they are the more exactly investigated and observed. I consider it as proven that Ramses II, the Sesostris of the Greeks, whose mummy was found a number of years ago,

was the Pharaoh of the oppression, and his son and successor, Merenptah, the Pharaoh of the Exodus. In Moses, the hero and leader of this expedition, tradition sees a Hebrew of the tribe of Levi. And just this fact is unquestionable because it alone offers us the key to one of the most puzzling phenomena in the history of Israel.

It is remarkable that the tribe of Levi appears in two forms which have nothing in common except the name. The earliest tradition describes it as a ruthless and violent secular tribe, who were cursed and condemned to destruction by the patriarch because of a bloody crime, and were actually destroyed. In the later tradition the Levites appear as a purely spiritual race of priests, who from the beginning were set aside for the service of God. The event which resulted in the overthrow of the secular tribe of Levi can have taken place only when Israel came into possession of Palestine, that is to say, in the time after Moses. This event was the treacherous and barbarous capture of the city of Shechem, which brought no blessing to the wicked tribe and its accomplice, Simeon. They succumbed to the revenge of the Canaanites when Israel solemnly separated from them and left them to expiate their burden of sin alone. That tradition should of its own accord have made Moses out to be a member of this cursed tribe is simply unthinkable, whereas if he were really a Levite the riddle is easily solved. Those portions of the tribe of Levi which belonged to the family of Moses and which were very closely connected with him and had placed themselves at his disposal, took of course no part in the criminal undertaking of the rest and so were not entangled in the catastrophe in which it resulted. Thus it happened in fact that only the priestly families remained, and these could hardly have the ambition to reestablish themselves as a secular tribe.

This Hebrew of the tribe of Levi, however, found access,

by a happy chance to the civilization and culture of Egypt, and was educated entirely as an Egyptian. It is certain that his name cannot be accounted for by Semitic derivation, whereas in the form *Mesu* it was a purely Egyptian name, which can be authentically proved to have been generally current at that time. Then too, Pinehas, a traditional name in the family of Moses, which we can not trace back to any Semitic root, is a purely Egyptian *Penehesu,* which likewise may be authentically proved. According to the Biblical narrative, Pharaoh's daughter found the child Moses in the Nile under circumstances familiar to us all, and adopted him as her son. The non-Biblical accounts give her name as Termuthis, or Merris, and in fact we can point out the two names Tmer-en-mut and Meri among the female members of the family of Ramses II.

The Biblical account touches but lightly on the childhood and youth of Moses. It presents him to us at the first as a man and the champion of his people. This deficiency too has been supplied for us by non-Biblical literature. According to Josephus the Egyptian priests demanded his death when he was first brought before Pharaoh, because a prophecy said that this boy would one day bring great evil to Egypt; but his foster mother protected him and bestowed upon him a careful education.

When Moses grew up, Egypt was invaded by the Ethiopians, whom no one had been able to withstand. Then according to the instruction of an oracle Moses was placed at the head of an Egyptian army and performed his task with wonderful intelligence and power, won victory after victory, and finally besieged the Ethiopians in their capital city, Meroë. There the Ethiopian princess, Tharbis, fell in love with him and on his promise to marry her surrendered to him the capital of the enemy, whereupon he returned in triumph to Egypt. We smile over such stories, but the fact remains authentically established that at the

end of the reign of Ramses II and at the beginning of that of Merenptah a certain Mesu was the Egyptian viceroy of Ethiopia, "Prince of Kush," as he was officially styled. Even in the Bible itself we have a very remarkable and puzzling passage where Miriam and Aaron make accusations against Moses on account of an Ethiopian wife he had taken (Num. xii. 1). In any case the peculiar double position of Moses, Hebrew by birth but Egyptian by education, is to be looked upon as historical, and in this respect we are involuntarily reminded of Arminius, the Teutonic Hermann the Cheruscan, who likewise entered into Roman service and arose to the dignity of a Roman knight, but only in order to learn from the Romans how he might free his people from their yoke. The inclination of his heart led Moses likewise to his people; he would rather be the brother of these despised slaves than live in the enjoyment of Egyptian luxury and splendor. If Moses had been born an Egyptian what could have induced him to place himself at the head of the Israelites with whom he could not even make himself understood because of the essential difference between their languages? Perhaps pity for the oppressed, who according to the Egyptian view were no better than the cattle which they herded? Or injured ambition because he did not rise rapidly enough in his career and so would rather be the first among the despised foreigners than to be second among the Egyptians? Neither can Moses have been a member of the Semitic tribes who led a nomad life around Sinai and with whom tradition has brought him in closest connection. The desert is egoistic. To but few does it give a scanty sustenance, so that every tribe would think well before inviting strangers to the table at which they themselves could hardly be satisfied even if they would have won additional strength and influence by such an increase in their numbers. In this point too the tradition

holds its own and every attempt to depart from it causes only entanglement in unsolvable difficulties.

But Moses was above all a founder of religion and therefore it becomes of very particular interest and the highest possible value for us to familiarize ourselves with the religious environment in which he developed. That the careful Egyptian education which fell to his lot was also a religious education, may be taken for granted. And the esoteric religion at least of the Egypt of that day stood upon a very high plane. Its belief was centered in a life beyond. The most important witness of the religious literature of Egypt is the so-called Book of the Dead which treats of the fate of the soul after death. When the soul escapes the fetters of the body it comes before the judgment of the dead where forty-two judges examine its conduct, each with regard to some one particular sin. If these judges declare the soul to be pure it enters into the realm of light, it becomes God once more and returns to God from whom it came. Especially have the mysteries of Osiris this cycle for their object, and we know definitely that in the bosom of the Egyptian priesthood monotheistic speculations were customary, or those with a tendency towards monotheism. To be sure these speculations never led to a practical religious monotheism but at most to a philosophical pantheism. Heliopolis, the Biblical On, had always been one of the main centers of the mysteries of Osiris; and yet it must arouse our attention when an Egyptian tradition, handed down to us from Manethos, says that Moses came from the circle of the Heliopolitan priesthood of Osiris, and when Biblical tradition places Joseph in direct connection with them, since Pharaoh gives him to wife Asenath, the daughter of Poti-phera, priest of On (Gen. xli. 45).

The attempt had even been made in Egypt once before to establish monotheism practically. Not through the

priests, it must be noted, but on the part of the state. Amenhotep IV, the last direct scion of the renowned 18th dynasty, the so-called "heretic king," undertook to establish by the power of government the worship of one God whom he saw incarnate in the solar disk *aten*, hence a solar monotheism, beside which all other cults were to be prohibited. That this remarkable man (who also took a fancy to have himself and his family portrayed in a repulsively ugly fashion), did not attain his purpose, and that the heresy of the heretic king died with him, may be taken for granted. Posterity has condemned him to non-existence, and his name was effaced from all inscriptions, but his attempt remains noteworthy for the history of religion, and there is no doubt but that Moses knew of these things which took place perhaps a hundred years before his time. Thus by no means did he lack religious stimulation in Egypt.

Furthermore his must have been a pronouncedly religious nature, an innate religious genius, and with regard to this we must take into consideration certain influences of his own people. According to Biblical tradition the work of Moses did not fall from heaven but had its point of contact in his own nation and found a prepared ground; neither did the religious history of Israel originate with Moses, but had its beginnings in an earlier time, closely connected with the person of the patriarch Abraham. In this important point too, it is my firm conviction that the Biblical tradition is a perfectly correct; namely, that we must assume the patriarchs of the people of Israel to have had before Moses a pronounced religious character which raised them above related tribes and which was a spiritual power ever against the Egyptians.

The decisive moment in Moses's entire life was during his sojourn among the Midianites in the wilderness of Sinai. There he had become the son-in-law of a Midianite

priest to whom even the Israelitish tradition assigns a certain share in the work of Moses. Even the natives of this Sinai neighborhood we must not imagine as entirely, or even half, wild bushmen. On the contrary, Arabia was the center of an ancient and high civilization, although whether it really reached back to the times of Moses may well be questioned. But at least the Arabian borderlands were under the influence of Egyptian and Babylonian civilization and religious movements, since it is well known that Sinai bears the name of the ancient Babylonian moon-God, Sin. Accordingly the religious soil is here no fallow land. The Biblical tradition itself says distinctly that the new name Yahveh, by which Moses designated the God of their fathers, originated from Sinai and was derived from there, that even before Moses a god Yahveh was worshiped on Sinai.

Here on Sinai took place the event which was for Moses what John's baptism in the Jordan was for Jesus, and the day of Damascus for the Apostle Paul; the Biblical account describes it as the theophany of the burning bush (Exodus iii). We can not explain it nor analyze it but must accept it as a fact—as the phenomena of the religious life do not upon the whole admit of demonstration and mock every rational explanation, but nevertheless are realities. Here God himself laid hold upon him and took possession of him. From this moment he knew himself to be called of God as the saviour of his people and that he must plan his entire future life in the service of this God. He hastened to Egypt in order to call his people to freedom in the name of the God of their fathers who had appeared to him on Sinai. And here too the religious motive glimmers plainly through the oldest account, for they are to travel in the wilderness in order to celebrate there a great festival for their God. And the bold enterprise succeeded. Even in the most supreme extremity and in the greatest dangers

in the face of the despairing and discouraged people Moses clung to the God who had called him, and his faith was not to be shaken. There, as the Biblical account states briefly and strikingly, Israel saw the powerful hand of Yahveh which he had shown to the Egyptians. Then the people feared the Lord and believed the Lord and his servant Moses (Ex. xiv. 31). This triumphant moment made Israel into a nation and Israel never forgot it. Here Israel recognized the God of their fathers who with a strong hand and an outstretched arm had delivered his people and had led them forth out of the house of bondage, out of the land of Egypt. Here too we have a matter of fact to recognize; the deliverance from Egyptian bondage must have been effected by an extraordinary event in which those who experienced it could see nothing but the direct personal intervention of God himself.

At this point, very involved questions begin to arise for the historian which I will at least indicate briefly. It is well known that the mountain where the law was given to Moses is sometimes called Sinai and sometimes Horeb. Are these only two different names or do they indicate two different mountains? And where may this Sinai, or Horeb, be found? Besides it is still maintained on reasons not to be despised, that the oldest narrative makes no mention whatever of this digression by way of Sinai, but had the people of Israel from the beginning wander directly to Kadesh. These are questions which may never be answered with certainty and which need not occupy us here any further. With Kadesh, surnamed Kadesh Barnea in distinction from other places of the same name and to-day the oasis Ain Qudês at the southwest extremity of the Plateau of Azâzime, we have absolutely firm ground beneath our feet. Kadesh is pointed out by tradition so consistently and so positively as the stopping place of Israel after the Exodus and as the scene of Moses's organizing

and administrative activity, that any doubt of this fact would only draw a smile from a methodically trained historian. Now we shall advance to the investigation of his work.

However, there are two methodological considerations to be disposed of first. The man who wishes to influence his times and to direct them into new paths, must stand above them. Therefore even when we have become acquainted with the religious plane of his time we have not yet familiarized ourselves with his personal religious consciousness, for genius is an absolutely incommensurable quantity, and so likewise is religious genius. Furthermore it is a matter of experience that after religious movements have entered into life they usually forfeit their original freshness and purity so that they become secularized and ossified. Supposing that we did not have the four gospels, or that Luther's writings were lost, who would be able to construct the Gospel of Jesus in its entire purity and splendor from the faith and life of the Christian communities of the middle of the 5th century? Or who, by considering the condition of the Lutheran Church at the time of the Protestant scholasticism or the writings of a Calovius and Quenstedt, could imagine that Luther had composed such a precious booklet as his "Freedom of the Christian"? This privilege, however, we must grant also to Moses, and the more since we possess actually no documents by him or about him. Yes, even the fact that we can not positively prove the existence of definite laws or even positively prove their non-existence proves nothing against Moses. As Jesus said to his disciples (John xvi. 12): "I have yet many things to say unto you, but ye can not bear them now," so Moses too may have thought, and I am firmly convinced that such is the fact. I might make the statement that Moses shows himself to be a genius in pedagogy since he would not take the second step before the first, and

promoted his work most emphatically by that which he did *not* give his people. He gave them no superfluous ballast but only what they could grasp and what they needed; not philosophical speculations, nor dogmatic instruction, but life, the most vital life, religious life, moral life.

I will select two important points for the explanation of what I mean by the two methodological considerations. It may have offended many of my readers when I was obliged to declare that Moses could not have enacted a law prohibiting images and have made it a foundation stone of his religion; but does this prove, or do I mean by it to say, that Moses was a worshiper of images and thought it right and praiseworthy to worship God in images? The only object relating to worship which we can refer back to him with certainty is the holy Ark, a pure symbol which never misled the people to any idolatrous misuse; and at the same time the tribes and races in the midst of which Israel lived at the time of Moses were not idol worshipers in this sense, but they too had only religious symbols; so that Moses had no practical occasion for such a command, whereas he himself acted according to this knowledge, and his work lay entirely in this direction.

Now for the chief central question with regard to monotheism. That Israel did not possess a pure, clearly conceived monotheism for centuries after Moses, that in the eyes of Israel Yahveh was not the one God in heaven and upon earth, but that they saw realities also in the other gods, is absolutely certain. But what does this prove in regard to Moses? Can not Moses personally have held to a pure monotheism? Who will decide *a priori* the point beyond which genius may not pass, and must Moses have confessed a religious perception inferior to that of the author of the ancient narrative of paradise and the fall of man, whose monotheism indeed leaves nothing to be de-

sired? Could not Moses be content with what he actually accomplished, to bid Israel to worship its own God only and to forbid it to serve any other God besides? If Israel was actually convinced that it had only its one God to serve, who laid claim upon it as his possession alone, and wished to be everything to it, that would be practically much more valuable than any theoretical doctrine about the nature of God, and Moses could confidently leave the rest to God and time.

So much is made nowadays of monotheistic currents in the religions of ancient civilizations. But however great we may assume the influence of the Egyptian esoteric doctrine upon Moses to have been, even if a pure monotheism was taught in these mysteries, still to Moses belongs the enormous merit that what was whispered about among the initiated in Egypt was now preached from the house tops and made useful to humanity, and especially that he had drawn the religious consequences therefrom. These same Egyptian priests who in their esoteric teachings gave themselves up to the most profound speculations, prayed in public with the most earnest air of solemnity to cats and ibises, crocodiles and the "holy ox" as Theodore Mommsen translates the "Apis," and rendered to them divine honors; but a purely theoretical monotheism which exists in a brotherly fashion side by side with the grossest practical idolatry, is religiously not worth a farthing. In this respect Moses accomplished a sweeping reform and performed a complete task: such a double entry method of book-keeping was impossible in the religion of Moses. In all religions there have been monotheistic tendencies, currents and attempts, but only in the religion of Israel had monotheism become a power, and indeed a power determining the entire religion; and this is the work and merit of Moses. Nor did he hesitate to shed blood, as is shown by that remarkable story attested by the oldest tradition,

in which he enlisted the tribe of Levi to aid in putting down a religious rebellion (Exodus xxxii. 26 ff., compare Deuteronomy xxxiii. 8 f.) When Saul caused all the wizards and those who had familiar spirits to be hunted out and executed (1 Samuel xxviii. 3 and 9), he proceeded entirely in the spirit of the zealous God of Moses who permitted none other to rule beside himself. And this enormous energy which supplanted all rivals making it impossible for them to exist side by side with himself, the God of Moses manifested also in the spiritual realm. Israel is the only nation of which we have knowledge, that has never had a mythology, that never differentiated divinity according to sex—the concept "goddess" is so absolutely inconceivable to the Israelites that the Hebrew language never attempted to form the word "goddess." This is a miracle performed by Moses which is greater and more incomprehensible than the greatest and most incomprehensible which tradition has ascribed to him. A man who has exercised such an enormous influence on the entire thought and sensibility of his people and has modelled it so completely according to his own personal higher knowledge, such a one truly belongs to the greatest spiritual heroes of humanity.

We have repeatedly called attention to the fact that Moses aimed first of all to awaken religious life. Especially significant for this and of definitive importance for all later time is the form of his religious foundation. Yahveh alone Israel's God, and Israel Yahveh's people,—this is perhaps the shortest formula to which we can reduce the fundamental idea of Moses. But how came this relation to exist? All tradition unites in agreeing that in its form the peculiar establishment of the religion of Israel consisted of a covenant between Yahveh and Israel, made through the intervention of Moses. By this means alone was this relation lifted out of the realm of nature into that of the moral

decision of the will. This covenant was grounded upon experience of the power of Yahveh. He had made real that which appeared impossible, had freed Israel from the bondage of Egypt, had therefore shown himself more mightly than even powerful Egypt with all its many gods, and had also given further proof of his power to help. So the God to whom Israel in this covenant had vowed herself by a free act of will, was not an abstraction, not an unyielding destiny but the personal living God of history, the relation to him was a personal ethical relation which as it was entered upon voluntarily could also be broken voluntarily. Whether Moses himself had already drawn this conclusion, and had it in mind, we know not. Later it gave the prophets a basis for their ethical preaching and their deepening of the religious relation.

That this relation of Israel to Yahveh was not purely theoretical but also manifested itself in a practical manner may be taken for granted. Its official manifestation, so to speak, was to be found in the religious worship. That Moses had regulated the religious service and standards for the worship of Yahveh is a matter of course. To be sure we can not reconstruct exactly this Mosaic order of service in particulars, but we must assume that Moses inspired a new spirit into the worship which made it possible for it to keep the most important heathen abominations at a distance. Among the nations in the vicinity of Israel the customs of infant sacrifice and religious unchastity prevailed. These were proscribed by the religion of Israel and wherever they crept in were recognized at once as poison drops foreign to its blood.

Furthermore, the relation of Israel to Yahveh manifested itself in a moral life, according to the requirements of this God. Here we have the peculiar center of the activity of Moses whom tradition describes before all as the judge and organizer of his people. And right here has

the consequence of his activity been visible and significant. In fact Israel stood far higher morally than the neighboring peoples. It must have had a particularly pronounced sense of right and wrong, and the sphere of morals in a most special sense was peculiarly Israel's honor and renown. From the beginning Israel had abhorred unchastity in a manner that we do not find to be the case with other Semites. All of this is due to Moses, who silently and unobtrusively organized his people in Kadesh, moralizing, guiding, and sowing noble seeds, and who educated them religiously in the sense and spirit of the Decalogue, even if he did not himself formulate it, and so made it possible for them to become the nation of religion and in the course of centuries to bring forth the greatest of all.

It is most probable that Moses also died in Kadesh. According to all indications Israel's stop there must have been a pretty long one, and it is an essential feature of the Israelitish tradition that neither Moses nor any of those who came out of Egypt was permitted to tread the promised land; and this is of greater significance when we consider that we are dealing with a distance which under normal conditions could have been easily passed in a fortnight. Of special importance for this question, however, is the explicit statement that nobody knows where Moses's grave is "unto this day" (Deut. xxxiv. 6). When we consider what an important part the grave, and especially the grave of a hero, played in the conception of ancient Israel, we must declare it to be absolutely unthinkable that the grave of Moses should have remained unknown if he had died and had found his last resting place in a spot which Israel considered as belonging to its domain. But we must look upon this circumstance too as providential, for if the grave of Moses had been known, there is no doubt but a personal cult would have been connected with it which might have

had evil consequences for the religion he had founded. This was not to be. He was to live on only in his work.

There is a beautiful Jewish legend about the death of Moses. It is possible to translate the fifth verse in the last chapter of Deuteronomy relating to his death, "So Moses, the servant of the Lord, died there *at the mouth* of Yahveh." Therefore the Jewish legend tells how in the last hour of Moses's life God fulfilled his ardent wish to behold His face, which in life He was obliged to refuse him(Ex. xxxiii. 18-23) and so Moses died at the mouth of God who by a kiss took to Himself the soul of his faithful and trusted servant. A deep meaning lies in this story, for verily did Moses receive the consecration kiss of deity. Whoso recognizes in Jesus Christ the end and turning point in the history of humanity must also confess that before him no greater mortal trod this earth, and that to no second mortal does humanity owe more than to Moses, the man of God. The foundation of what in Jesus Christ has found its conclusion and its perfection, was laid by Moses, since he was the first to give to the world clearly and consciously as the foundation and basic principle of all religious life, the faith in the one, living, personal, holy God.

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THE DRAMATIC ELEMENT IN THE UPANISHADS.

A GOOD many readers make the acquaintance of the Upanishads in the two volumes which Prof. Max Müller contributed to the now world-famous *Sacred Books of the East,* the first being the opening volume of that long and wonderful series. It is, therefore, to some degree a matter of regret that Prof. Max Müller decided to begin his work of translation just where he did, namely, with the Chhandogya Upanishad; for it happens that the opening passages of that wonderful and complex tract are occupied with a very interesting, but at the same time very confusing and prolix disquisition, which must be practically meaningless to many readers, and which must give a rather misleading and discouraging view of the whole content of the Upanishads.

One may, perhaps, suppose that the Upanishads could be compared to some of those minerals which one sees in our museums, where bright and beautifully formed crystals are embedded in dull, unattractive matrix of quite different nature, and that this opening passage of the Chhandogya is a part of the matrix. Perhaps it may be possible to cut away the matrix, and rearrange the crystals, now revealed as precious gems, in some more attractive order. And a part of the matrix which may, perhaps, have to be set aside, is the Brahmanical view that the Upanishads, in their central and essential material, have a close connection with the Four Vedas, or with the Vedic

"Youth!" said he.

"Sir!" he replied.

"Hast thou received the teaching from thy father?"

"Yes!" he said.

"Knowest thou how these beings going forth from this world, proceed on different paths?"

"No!" said he.

"Knowest thou how they come to this world again?"

"No!" he said.

"Knowest thou how that world is not filled up by the many going thither again and again?"

"No!" said he.

"Knowest thou at which sacrifice being sacrificed, the waters, rising up, speak with human voice?"

"No!" said he.

"Knowest thou the approach of the path of the gods, or of the path of the fathers, or by doing what they approach the path of the gods or the path of the fathers: as the word of the Rishi has been heard by us:

"'Two ways I heard of, for mortals, the way of the fathers and the way of the gods.
By them goes all that moves, between father heaven and mother earth.'"

"No!" said he; "I do not know even one of them."

The king invited him to remain as his pupil. Not consenting to remain, he ran away to his father. He said to him:

"Forsooth, Sir, thou didst say that we had received the teaching!"

"How now, wise one?" he answered.

"This Rajanya fellow has asked me five questions, and I do not know one of them!"

"What were they?" said he.

"These!" said he, and he enumerated them.

His father said:

"Thou knowest us thus, dear, that whatever I know, I told it all to thee! But come, let us two set forth thither, and dwell as pupils with the king!"

"Go yourself, Sir!" said he.

That descendant of Gotama went to where Pravahana, son of Jivala was. To him offering a seat, the king caused water to be offered. He made him the offering. To him the king said:

"We give a wish to the worshipful descendant of the Gotamas."

He said:

"This wish is promised to me: the speech that thou didst speak in the presence of the boy, tell me that!"

The king said:

"That, O descendant of the Gotamas, is among the wishes of the gods. Say a wish of men!"

He said:

"It is well known! There is store of gold, of cattle and horses, of slave-girls and tapestries and robes! May the Master not be niggardly toward us, in that which is great, infinite, illimitable!"

The king said: "This wish, descendant of the Gotamas, must be sought according to rule."

"I offer myself as thy pupil!" said he. For with this word the men of old betook them to a master. He therefore dwelt there, thus becoming his disciple.

The king said to him:

"Therefore, O descendant of the Gotamas, be thou without reproach toward us, thou and thy forefathers: since this teaching never before dwelt in any Brahman, but to thee I shall declare it, for who has the right to refuse thee, speaking thus!"

So far, the prologue of the story. Before translating the teaching of the king it may be well to make some comments on what we have already recorded.

To begin with, it is evident that the Brahman boy Shvetaketu did not well consider and ponder over the questions that were put to him, for, with the exception of the last, the group of questions imply their own answers. Thus the first question, as to the diverging paths on which beings proceed on going forth from this world at death, is really answered by the fourth question. For the diverging paths are the path of the gods and the path of the fathers, by which goes all that moves between father heaven and mother earth. In like manner the answer to the question why the other world is not filled to overflowing by the souls that go thither incessantly, is because

they come to this world again. Therefore we are here concerned with the teaching of rebirth, or reincarnation.

As has already been said, there is another version of this same story in the Upanishad which is next in length to the Brihad Aranyaka, namely, in the Chhandogya Upanishad. It is in the third and following khandas of the fifth Adhyaya. There are certain verbal variations, as for example *samiti* instead of *parishad,* for the "assembly" of the Panchala nation. The order of the questions is not exactly the same, and in the last question, instead of asking "at which sacrifice the waters arise, and speak with human voice?" he asks: "Knowest thou how, at the fifth sacrifice the waters arise," and so on. But the most important difference is in the words of the Rajanya to the old Brahman, when he at last consents to tell him the answers to the questions:

"As this teaching, O descendant of the Gotamas, goes not to any Brahman before thee, but among all peoples leadership was of the Kshatra," that is, of the Kshatriyas, the men of the Rajanya race.

For there is much evidence to show that the difference between the Brahman and the Rajanya was not merely a difference in "caste," that is, in social position and function, but was in fact a difference in race, or in "color," as the Sanskrit word *varna,* translated "caste," really means. The evidence on this point has been set forth elsewhere at considerable length, supported by the testimony of the best authorities. It must suffice here to say that it falls naturally into two parts: first, the proof that the Rajputs of to-day are ethnically distinct from the Brahmans of pure stock, the Rajputs being a red, ruddy or copper-colored race,[1] while the Brahmans are white-skinned, and

[1] A number of distinguished men, who had a special knowledge of Rajputana, have put themselves on record concerning the skin-color of the Rajputs (see *Royal Asiatic Quarterly,* 1893, p. 390). Sir George Birdwood wrote, with special reference to a passage in the Mahabharata: "*lohita,* red, ruddy, is a proper epithet to apply to a pure Rajput." Sir William Moore said that

the two races being further distinguished by skull-form, stature, and the other qualities which make for race-difference. The descent of the pure-blooded Rajput of to-day from the Rajanya of two thousand years ago is unquestioned, as is the race-continuity of the pure-blooded Brahman. This brings us to the second part of our evidence: the fact that the race-difference between Rajanya and Brahman was recognized in India more than two thousand years ago; and that precisely the difference in color which we have described, was hit on as a distinguishing character. There are, of course, besides the red Rajput and the white Brahman, two other ancient race-stocks in India distinguished by color: namely, the yellow races, generally called Kolarian, such as the Santals of Bengal and the Savaras of Madras; and the black Dravidian races of the south, whose languages are Tamil, Telugu, Malayalam and the rest of the Dravidian family. The yellow races seem to have inherited from a remote time the culture of rice and silk, which are so characteristic of the yellow race in China;[2] and the black races, the Dravidians, have re-

"red, ruddy, rust-colored would describe the appearance of the best class of Rajputs, but there are many who would come under the heading brown." Sir Richard Meade added important details: "I have had much intercourse with Rajputs of all classes, and should say that the color of the true Rajput is fairer than that of the people of the northwestern provinces, i. e., that the skin is clearer under the color, if I may so describe it, while the color itself is somewhat less pronounced. Of course, as a rule, Chiefs and Thakurs are fairer than the lower orders of Rajputs, who are themselves more exposed, and who are the descendants of those who for many generations have been so." In answer to an inquiry as to the skin-color of the Rajputs under the sunburn, Sir Richard Meade wrote: "The sub-shade of color in many of the Rajputs I have seen was of a light ruddy character, in others it was rather sallow, and in others again of a dusky reddish tinge." Sir Richard Temple endorsed these conclusions, saying: "I should concur in the view that the color of the true Rajputs is a reddish brown, and that it is possible or likely that the brownish element is only the result of sun-action." Dr. Fitzedward Hall added the point that the skin-color of the true Rajputs is extremely like that of the Red Indians of America.

[2] Cf. R. F. Johnston, F.R.G.S., M.R.A.S., *From Peking to Mandalay*, p. 438, Note 41: "It seems quite clear that the Licchavis—or the great Vaggian or Vrijian clan-system to which they belonged and from which the Mauryans sprang—were neither Aryans nor Dravidians. In all probability they were of Kolarian or Munda race. The Kolarians seem to have entered India from the northeast—just as the Aryans afterwards entered it from the northwest—and extended themselves over vast areas from which they were subsequently

markable skill in handicrafts, in building, in metal work, and so on, the temples of Madura and other southern cities being among the wonders of the world.

Keeping this position of the four races or "colors" in mind, we are in a position to see the absolute accuracy of the following passage from the Mahabharata, in the Shantiparvan, beginning at verse 6934:

"The color (*varna*) of the Brahman was white, that of the Kshatriyas red, that of the Vaishyas yellow, that of the Shudras black. . . . This world, having been at first created by Brahma entirely Brahmanic, became separated into color in consequence of works. Those twice-born men who were fond of sensual pleasure, fiery, irascible, prone to violence, who had forsaken their duty, and were red-limbed, came into the condition of Kshatriyas.

"Those twice-born who derived their livelihood from kine, who were yellow, who subsisted by agriculture, and who neglected to practise their duties, entered into the state of Vaishyas. Those twice-born who were addicted to mischief and falsehood, who were covetous, who lived by all kinds of work, who were black and had fallen from purity, sank into the condition of Shudras."

The two words used to describe the skin-color of the military race, the Kshatriyas, in this passage, *lohita* ("red") and *rakta-anga* ("red-limbed"), are admitted by the highest authorities to be accurately descriptive of the skin-color of the military race of Rajputs at the present day. It would seem, therefore, that we have a conclusive demonstration of the true relation of the "castes"; they are really, what the Sanskrit word means, "colors," the colors of four distinct races, white, red, yellow and black as we find them in India to-day, and as they must have been when the balance of power between the four races, which is called

driven by Dravidians and Aryans. They must have originally come from the countries that lay to the east, which we now know as Burma, China and Indo-China."

the Chaturvarnya, or "Four-color system," was first struck in that admirably durable polity which finds its most famous expression in Manu's Laws. The two fundamental principles of this polity were first, that each race must remain distinct, of pure blood, intermarriage being heavily penalized; and, secondly, that each race should perform, in the state, those functions for which it was fitted by physical character and moral development. Both principles are thoroughly sound and wise; and to their wisdom was due the long duration of the "four-color system," in India.[3]

If, therefore, as seems certain, the difference between the Brahmans and the Rajanyas or Kshatriyas is really a difference of race; if they were in the beginning two independent race-stocks, then the words in our Upanishad story take a new and striking significance: "This teaching never before dwelt in any Brahman, but was among all peoples the instruction of the Kshatriya alone." On this sentence, Shankaracharya, the greatest of the Brahmans, comments: "This teaching was handed down for a long time, by the succession of teacher and pupil, among the men of the warrior race." The word translated "succession of pupil and teacher," Kshatriya-*parampara*, as used by Shankara, has a technical meaning very close to "apostolic succession." One may illustrate it by saying that the "Shankara-guru-parampara" chain, the chain of the the successors of Shankara himself, is still unbroken at the Shringeri math in Mysore. The word implies the handing down of a mystery teaching through initiation.

[3] Cf. T. W. Rhys Davids, *Buddhist India*, Preface, p. iii: "In the following work a first attempt has been made to describe ancient India from the point of view, not so much of the Brahman, as of the Rajput." And again, p. 53: "The basis of the social distinctions was relationship; or, as the Aryans, proud of their lighter color, put it, color. Their books constantly repeat a phrase as being common amongst the people, which divided the world, as they knew it, into four social grades, called colors (Pali, *vanna*). At the head were the Kshatriyas, the nobles. They were most particular as to the purity of their descent through seven generations, both on the father's and the mother's side; and are described as 'fair in color, fine in presence, stately to behold' (*Dialogues of the Buddha*, i, 148; Vin. II, 4, 160)."

On the Brihad Aranyaka Upanishad version of the story, Shankara makes a practically identical comment, using the same technical phrase, with the same implication of a mystery teaching, handed down among the Rajanyas by initiation.

One version of the story we have translated comes, as we saw, from the Brihad Aranyaka Upanishad. This Upanishad is attributed to, or associated with, the school of the Vajasaneyins, the chief school of the White, or clarified Yajur Veda. The other version of the story comes from the Chhandogya Upanishad, which is in like manner associated with the Sama Veda. The accepted theory is that the schools which made these divisions of the Vedas their special study, developed the corresponding Brahmanas and Upanishads by speculation on the sacrificial parts of the Vedic hymns. But so far as the two versions of the story of Shvetaketu are concerned, this is apparently mere myth-making. There is not the slightest necessary connection between the story and either Veda; nor do the slight differences between them, which we have noted, bear any relation at all to the difference between the Sama and Yajur Vedas.

The account inherent in the story itself is at variance with this supposed relation to the Vedic hymns. These hymns are, broadly speaking, and hymns like those attributed to Vishvamitra excepted, the creation of the white Brahmans, and they became the hereditary property, and liturgical capital, of these same Brahmans, a position which was maintained through milleniums of Indian history. But if we are to believe King Pravahana, and to understand his words in their plain sense as Shankara understands them, then the teaching imparted by the king was not the creation of the Brahmans at all, it was the hereditary secret teaching of the Kshatriyas, the red Rajanyas, handed down as a mystery teaching from teacher

to pupil, from master to disciple, and never before came to any Brahman, until that memorable occasion when king Pravahana himself imparted it to the Brahman Uddalaka the son of Aruna.[4]

Now let us return to the text of the Brihad Aranyaka Upanishad and see exactly what was this secret teaching of the red Rajanyas, then for the first time imparted to a white Brahman.

King Pravahana, son of Jivala, discloses the Rajanya view of human life by describing the condition of the soul before it leaves heaven to enter the form of an unborn infant. He uses a symbolism taken from the sacrificial

[4] Cf. Paul Deussen, *The Philosophy of the Upanishads*, p. 17 ff.: "The Upanishads have come down to us, like the rest of the texts of the three older Vedas, through the Brâhmans. All the more striking is it, therefore, that the texts themselves frequently trace back some of their most important doctrines to kings, i. e., Kshatriyas. Thus, in the narrative of Chând. 5, 11-24, five learned Brâhmans request from Uddâlaka Aruni instruction concerning the Atman Vais'vânara. Uddâlaka distrusts his ability to explain everything to them, and all the six therefore betake themselves to the King As'vapati Kaikeya, and receive from him the true instruction, the defectiveness of their own knowledge having first been made clear. In Brih., 2, 1 (and the parallel passage, Kaush. 4) the far-famed Vedic scholar Gârgya Bâlâki volunteers to expound the Brahman to King Ajâtas'atru of Kâs'i, and propounds accordingly twelve (in Kaush. 16) erroneous explanations; whereupon to him, the Brâhman, the king exhibits the Brahman as the âtman under the figure of a deep sleeper, prefacing his exposition with the remark, "that it is a reversal of the rule, for a Brâhman to betake himself as a pupil to a Kshatriya in order to have the Brahman expounded to him; now I proceed to instruct you." In this narrative, preserved by two different Vedic schools, it is expressly declared that the knowledge of the Brahman as âtman, the central doctrine of the entire Vedânta, is possessed by the king; but, on the contrary, is not possessed by the Brâhman 'famed as a Vedic scholar.' In Chând., I, 8-9, two Brâhmans are instructed by the King Pravâhana Jaivali concerning the *âkâs'a* as the ultimate substratum of all things, of which they are ignorant. And although it is said in Chând., I, 9, 3, that this instruction had been previously imparted by Atidhanvan to Udaras'ândilya, yet the names allow of the conjecture that in this case also a Brâhman received instruction from a Kshatriya. Similarly Chând. 7 contains the teaching given by Sanatkumâra, the god of war, to the Brâhman Nârada. Here the former pronounces inadequate the comprehensive Vedic learning of the Brahman with the words: 'All that you have studied is merely name.' Finally the leading text of the doctrine of the soul's transmigration, which is extant in three different recensions, is propounded in the form of an instruction given to Aruni by the King Pravâhana Jaivali....The fact, moreover, which is especially prominent in the last quoted passages, that the Brâhmans during a long period had not attained to the possession of this knowledge, for which they nevertheless display great eagerness, is most simply explained on the supposition that this teaching with regard to the Atman was studiously withheld from them; that it was transmitted in a narrow circle among the Kshatriyas to the exclusion of the Brahmans; that, in a word, it was *upanishad*."

altar, and speaks of "the fire, the fuel, the flame, the smoke, the embers and the sparks." We may lay aside this really eloquent symbolism, and summarize this part of the teaching.

The soul, King Pravahana teaches, dwells in the celestial world. In it adhere certain streams of tendency, which he calls "the waters," the currents of moral and mental life. The soul descends from the celestial world to the midworld, through sacrifice, and in the midworld takes on a "lunar" form, the things of the midworld being always compared to the moon, which waxes and wanes, and shines by reflected light; the celestial or spiritual world in contrast being always compared to, or symbolized by, the sun.

The soul continues its downward course and enters the sphere of this world. This is again called a sacrifice. The soul then comes into relation with its future father and mother, these relations being again symbolized as sacrifices. Finally there comes the fifth sacrifice, the sacrifice of physical birth, after which "the waters," that is, the currents of character forming the new-born child, "arise, and speak with human voice"; thus giving us the answer to the last of the five questions proposed to young Shvetaketu by the Rajanya king.

At this point, we may once more try to translate the Upanishad text:

"From this sacrifice, the man comes to birth. He lives his full life-span, and then he dies, and they take him to the pyre...In this fire the bright powers offer the man, and from that sacrifice the man is born, of the color of the sun.

"They who know this thus, and they who, in the forest, follow faith and truth, they are born into the flame, from the flame they go to the day, from the day to the waxing moon, from the waxing moon to the six months in which the sun goes north, from these months to the Deva-world, from the Deva-world to the sun, from the sun to the lightning; them, reaching the lightning, a person, mind-born, coming, leads to the worlds of the Eternal. They dwell in

those worlds of the Eternal, in the highest realms; for them there is no return.

"But they who win worlds by sacrifice, gifts, penance, they are born into the smoke of the pyre, from the smoke they go to the night, from the night to the waning moon; from the waning moon to the six months in which the sun goes south, from these months to the world of the fathers, from the world of the fathers to the moon. They, reaching the moon, become food. The gods feast on them, as they wax and wane, like the lunar lord. Then, going full circle, they descend to this ether, from the ether to the air, from the air to rain, from rain to the earth; reaching the earth, they become food. Again they are sacrificed in the fire of man and the fire of woman, and are reborn, coming forth again to the world of men. Thus, verily, they go on their circling way."

We are warned, of course, by the symbolical form in which the Rajanya states his questions, that the answers also are symbolical. We may suggest the interpretation of this symbolism by saying that the Rajanya teacher seems to describe a series of worlds, or planes of consciousness, in ascending degrees, from the higher of which the soul descends into incarnation. Further, he suggests that each world or plane has, as it were, a positive and a negative pole, a pole of spirituality and a pole of materiality. These poles of the ascending planes he suggests by a series of natural antitheses: the fire and the smoke of the pyre, for the positive and negative pole of the lowest plane; day and night, for the positive and negative pole of the next plane in ascending order; the moonlit and moonless fortnights for the poles of the next higher plane; summer and winter, for the poles of the next; the sun and moon for the next; the world of the gods and world of the fathers, for the poles of the next. This is really admirable and very consistent symbolism, and the use of the sun and moon for the spiritual and psychic worlds respectively, runs through all the Upanishads.

The suggestion is that the course of the soul at death, through these ascending planes, is determined by the quality of its spiritual life; the soul inspired by faith and truth gravitates to the spiritual pole of each plane, and ascending, comes to a realm where "a person, or spirit, mind-born, leads it into the world of the Eternal, whence it no more returns."

The soul, on the contrary, which seeks to win worlds through sacrifices, penances and gifts, worshiping selfishly, gravitates after death to the more material pole of each plane. It finds its way to the "lunar world," and there becomes "food for the gods." It wanes, and descends once more to this world, returning through the gates of birth to terrestrial life.

We have, therefore, on the one hand, the path of faith and truth, the path of the sun, the path of the gods, leading to the world of the Eternal from which there is no return, in a word, the path of complete Liberation, *moksha*, Nirvana; and, on the other, we have the path of selfish worship, the path of the moon, the path of the fathers, the path of Reincarnation, of Sansara, of the Circle of Necessity. We have, in fact, the fundamental antithesis, the twin-doctrine of Liberation and Reincarnation, which is the heart of the Indian wisdom. And we are told that "this teaching never before dwelt in any Brahman, but was, among all peoples, the hereditary teaching of the Rajanya alone." Finally, we have the strongest reason to believe that the red Rajanya represented not a different class, but a different race, from the white Brahman; a race which may well have been firmly established in India, when the white race, from which the Brahmans came, first descended from the Hindu Kush.

In another chapter of the Chhandogya Upanishad, namely, in the beginning of the Sixth Adhyaya, we have another story of Shvetaketu and his father, Uddalaka

Aruni, which is equally graphic and dramatic. It begins as follows:

There lived once Shvetaketu, Aruna's grandson; his father addressed him, saying:

"Shvetaketu, go, learn the service of the Eternal; for no one, dear, of our family is an unlearned nominal worshiper."

So going when he was twelve years old, he returned when he was twenty-four; he had learned all the teachings, but was conceited, vain of his learning, and proud.

His father addressed him:

"Shvetaketu, you are conceited, vain of your learning, and proud, dear; but have you asked for that teaching through which the unheard is heard, the unthought is thought, the unknown is known?"

"What sort of teaching is that, Master?" said he.

"Just as, dear, by a single piece of clay anything made of clay may be known, for the difference is only one of words and names, and the real thing is that it is of clay; or just as, dear, by one jewel of gold, anything made of gold may be known, for the difference is only one of words and names, and the real thing is that it is gold; or just as, dear, by a single knife-blade, anything made of iron may be known, for the difference is only one of words and names, and the real thing is that it is iron; just like this is the teaching that makes the unknown known."

"But I am sure that those teachers did not know this themselves; for if they had known it, how would they not have taught it to me?" said he; "but now let my Master tell it to me."

"Let it be so, dear!" said he.

"In the beginning, dear, there was Being, alone and secondless. But there are some who say that there was non-Being, in the beginning, alone and secondless; so that Being would be born from non-Being; but how could this be so, dear?" said he; "how could Being be born from non-Being? So there was Being, dear, in the beginning, alone and secondless.

"Then Being beholding said: Let me become great; let me give birth. Then it put forth Radiance.

"Then Radiance beholding said: Let me become great; let me give birth.

"Then it put forth the Waters. Just as a man grieves or sweats, so from radiance the waters are born.

"Then the Waters beholding said: Let us become great; let us give birth.

"They put forth Food. Just as when it rains much food is produced, so from the waters Food is born.

"Of all these, of beings, there are three germs: what is born of the Egg, what is born of Life, what is born of Fission.....

"Man, dear, is made of sixteen parts. Eat nothing for fifteen days, but drink as much as you wish; for Breath, being formed of the Waters, is cut off if you do not drink."

He ate nothing for fifteen days, and then returned to the Master, saying:

"What shall I repeat, Master?"

"Repeat the Rig, the Yajur, the Sama verses, dear!" said he.

"None of them comes back into my mind, Master!" said he.

He said to him: "As, dear, after a big fire, if a single spark remain, as big as a fire-fly, it will not burn much; just so, dear, of your sixteen parts one remains, and by this one part you cannot remember the Vedas.

"Go, eat; and then you will understand me."

He ate, and then returned to the Master; and whatever the Master asked, all came back to his mind.

The Master said to him: "As, dear, after a big fire, if even a single spark remain, as big as a fire-fly, and if it be fed with straw, it will blaze up and will then burn much; just so, dear, of your sixteen parts one part was left; and this, being fed with food, blazed up, and through it you remembered the teachings.

"For mind is formed of Food; Breath is formed of the Waters; Voice is formed of Radiance."

Thus he learned; thus, verily, he learned.

Nothing could be more vivid and dramatic than the characterization of Shvetaketu, "conceited, vain of his learning, and proud." We at once recognize the pert youth who, after his father had instructed him, went to the assembly of the Panchalas, to be so wofully worsted by the Rajanya Pravahana, son of Jivala. It is to be noted that, even before his father took the vain youth in hand, he had learned the Three Vedas, and could repeat the verses of the Rig, the Yajur and the Sama Vedas. How was it then, that, being so fully instructed, he was so com-

pletely at a loss, when the Rajanya master asked him concerning the twin doctrines of Liberation and Reincarnation?

The answer is as simple as it is vital to a proper understanding of the wisdom of ancient India. He was at a loss concerning the twin doctrine of Liberation and Reincarnation precisely because these doctrines are nowhere to be found in the Three Vedas, which are concerned with quite other themes and purposes. At this point, we should do well to read the Tevijja Sutta, the Sutta, that is, of the Three Vedas; wherein another great Rajanya, of the royal race of Ikshvaku, cross-examines yet other Brahmans, well versed in the Three Vedas, concerning the Way of Wisdom.

In the further teaching imparted by Uddalaka Aruni to his son, there are certain passages well worth quoting here, both for their beauty, and because they form a characteristic part of the dramatic element in the Upanishads. The father has taught many things to the son.

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"As the honey-makers, dear, gather the honey from many a tree, and weld the nectars together in a single nectar; and as they find no separateness there, nor say: Of that tree I am the nectar, of that tree I am the nectar. Thus, indeed, dear, all these beings, when they reach the Real, know not, nor say: We have reached the Real. But whatever they are here, whether tiger or lion or wolf or boar or worm or moth or gnat or fly, that they become again. And this soul is the Self of all that is, this is the Real, this is the Self. That thou art, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"These eastern rivers, dear, roll eastward; and the western, westward. From the ocean to the ocean they go, and in the ocean they are united. And there they know no separateness, nor say: This am I, this am I. Thus indeed, dear, all these beings, coming forth from the Real, know not, nor say: We have come forth from

the Real. And whatever they are here, whether tiger or lion or wolf or boar or worm or moth or gnat or fly or whatever they are, that they become again. And that soul is the Self of all that is, this is the Real, this is the Self. That thou art, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"If anyone strike the root of this great tree, it will flow and live; if any one strike the middle of it, it will flow and live; if any one strike the top of it, it will flow and live. So filled with Life, with the Self, drinking in and rejoicing, it stands firm. But if the life of it leave one branch, that branch dries up; it leaves a second, that dries up; it leaves a third, that dries up; it leaves the whole, the whole dries up. Thus indeed, dear, thou must understand!" said he. "When abandoned by Life, verily, this dies; but Life itself does not die. For that soul is the Self of all that is; this is the Real, this the Self. That thou art, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he, "Bring me a fruit of that fig-tree."

"Here is the fruit, Master."

"Divide it in two," said he.

"I have divided it, Master."

"What do you see in it?" said he.

"Atom-like seeds, Master."

"Divide one of them in two," said he.

"I have divided it, Master."

"What do you see in it?" said he.

"I see nothing at all, Master."

So he said to him:

"That soul that thou perceivest not at all, dear,—from that very soul the great fig-tree comes forth. Believe then, dear, that this soul is the Self of all that is; this is the Real, this is the Self. That art thou, O Shvetaketu!"

"Let the Master teach me more!" said he.

"Let it be so, dear!" said he.

"Put this salt in water, and come to me early in the morning."

And he did so, and the Master said to him:

"That salt that thou didst put in the water last night—bring it to me!" And looking for its appearance, he could not see it, as it was dissolved in the water.

"Taste the top of it," said he; "how is it?"

"It is salt," said he.

Nachiketas comes to the House of Death; he speaks:

"Like Fire, a pure guest comes to the house. They offer him water to assuage him. Bring water, O Death, Son of the Sun!

"Hope and expectation, friendship, kind words, just and holy deeds, sons and cattle, this destroys, for the foolish man in whose house a pure guest dwells without food."

After three days Death comes. Death speaks:

"As thou hast dwelt three nights in my house, without food, thou, pure guest and honorable—honor to thee, pure one, welfare to me—against this choose thou three wishes!"

Nachiketas speaks:

"That the descendant of Gotama may be at peace, well-minded, and with sorrow gone, towards me, O Death; that he may speak kindly to me when sent forth by thee; this, of the three as my first wish I choose."

Death speaks:

"As before will the son of Aruna, Uddalaka's son, be kind to thee, sent forth by me; by night will he sleep well, with sorrow gone, seeing thee freed from the mouth of Death."

Nachiketas speaks:

"In the heaven-world there is no fear at all; nor art thou there, nor does he fear from old age. Crossing over both hunger and thirst, and going beyond sorrow, he exults in the heaven-world.

"The heavenly fire thou knowest, Death, tell it to me, for I am faithful. The heaven-worlds enjoy deathlessness; this, as my second wish, I choose."

Death speaks:

"To thee I tell it; learn then from me, Nachiketas, finding the heavenly fire. Know thou also the obtaining of unending worlds, the resting-place, for this is hidden in secret."

He told him then that fire, the beginning of the worlds, and the bricks of the altar, and how many and how they are. And he again spoke it back to him as it was told; and Death, well pleased, again addressed him:

"This is thy heavenly fire, O Nachiketas, which thou hast chosen as thy second wish. This fire as thine shall they proclaim. Choose now, Nachiketas, thy third wish."

Nachiketas speaks:

"This doubt that there is of a man that has gone forth: 'He exists,' say some; and 'He exists not,' others say: a knowledge of this, taught by thee, this of my wishes is the third wish."

Death speaks:

"Even by the gods of old it was doubted about this; not easily knowable, and subtle is this law. Choose, Nachiketas, another wish; hold me not to it, but spare me this!"

Nachiketas speaks:

"Even by the gods, thou sayest, it was doubted about this; and not easily knowable is it, O Death. Another teacher of it cannot be found like thee. No other wish is equal to this!"

Death speaks:

"Choose sons and grandsons of a hundred years, and much cattle, and elephants and gold and horses. Choose the great abode of the earth, and for thyself live as many autumns as thou wilt.

"If thou thinkest this an equal wish, choose wealth and length of days. Be thou mighty in the world, O Nachiketas; I make thee an enjoyer of thy desires.

"Whatever desires are difficult to gain in the mortal world, ask all desires according to thy will.

"These beauties with their chariots and lutes—not such as these are to be won by men—be waited on by them, my gifts. Ask me not of death, Nachiketas!"

Nachiketas speaks:

"These fleeting things, O Death, wear out the vigor of a mortal's powers. Even the whole of life is short; thine are chariots and dance and song.

"Not by wealth can a man be satisfied. Shall we choose wealth if we have seen thee? Shall we desire life while thou art master? But the wish I choose is truly that!

"Coming near the unfading immortals, a fading mortal here below, and understanding, thinking on the sweets of beauty and pleasure, who would rejoice in length of days?

"This that they doubt about, O Death, what is in the great Beyond, tell me of that. This wish that draws near to the mystery, Nachiketas chooses no other wish than that!"

Death speaks:

"The better is one thing, the dearer is another thing; these two bind a man in opposite ways. Of these two, it is well for him who takes the better; he fails of his object, who chooses the dearer.

"The better and the dearer approach a man; going round them, the sage discerns between them. The sage chooses the better rather than the dearer; the fool chooses the dearer, through lust of possession.

"Thou indeed, pondering on dear and dearly loved desires, O Nachiketas, hast passed them by. Not this way of wealth hast thou chosen, in which many men sink.

"Far apart are these two ways, unwisdom and what is known as wisdom. I esteem Nachiketas as one seeking wisdom, nor do manifold desires allure thee.

"Others, turning about in unwisdom, self-wise, and thinking they are learned, fools, stagger, lagging in the way, like the blind led by the blind.

"The great Beyond gleams not for the child, led away by the delusion of possessions. 'This is the world, there is no other,' he thinks, and so falls again and again under my dominion.

"That is not to be gained even for a hearing by many, and hearing it many understand it not. Wonderful is the speaker of it, blessed the receiver; wonderful is the knower of it, taught by the blessed."

Most willingly would I continue the magnificent address of King Death, did space permit. But it seems better to comment on certain passages in what has been translated, and then to pass on to another of the dramatic pieces in the Upanishads.

To begin with, one cannot fail to be struck by the resemblance of the general situation in the Katha Upanishad to that in the dramatic fragment already translated, where King Pravahana addresses the old Brahman, Uddalaka Aruni. Here, again, we have the teacher trying the disciple, putting him off with "wishes of things mortal." In the former case it was: "store of gold, of cattle and horses, of slave-girls and tapestries and robes." The offer of Death is much the same: "Sons and grandsons, and much cattle, and elephants and gold and horses; these beauties, with their chariots and lutes, be waited on by them, my gifts!" This close resemblance long ago suggested to me a possible verbal emendation in the Sanskrit of the former passage. The accepted reading of the answer of the old Brahman is: *Vijñâyate; ha asti hiranyasya âpâttam go-ashvânân dâsînâm pravârânâm paridhânasya.* Instead of

ha asti, I should like to propose the reading: *Hasti-hiranyasya âpâttam,* that is, "store of elephants and gold," the compound *Hastihiranyam* occurring elsewhere twice in the Upanishads, in a sentence of just this kind; once, namely, in the Katha Upanishad, in the passage under discussion: *Shatâyushah putrapautrân vrinîshva, bahûn pashûn hasti-hiranyam ashvân*; and again in Chhandogya Upanishad, in the twenty-fourth section of the seventh chapter: *Go-ashvam iha mahimâ iti âchakshate hasti-hiranyam dâsa-bhâryam,* and so on.

If this proposed reading be acceptable, then we have a set phrase, a sacramental formula, fairly the equivalent of "the kingdoms of this world and the glory of them," in the Temptation in the Wilderness, which bears a close resemblance to the temptation of Nachiketas by the Lord of Death. There is also a strong suggestion of kinship in the sacrifice of the only son, who, descending into the house of Death, rises immortal on the third day.

It is quite clear that Death is imparting to Nachiketas the same teaching which King Pravahana, son of Jivala, revealed to Uddalaka Aruni: the twin teaching of Liberation and Rebirth. "The great Beyond gleams not for the child, led away by the delusion of possessions. 'This is the world, there is no other,' he thinks, and so falls again and again under my dominion;" enters, in fact, the circle of necessity, the chain of repeated death and rebirth, of forced Reincarnation. On the other hand is the great Beyond, the path of the gods, and full Liberation.

We get a great deal of additional light on this antithesis from yet other dramatic pieces in the Upanishads, as, for example, from certain of the answers in Prashna Upanishad, which is, perhaps, the most consistent instance of the dramatic form in the Upanishads. This Upanishad depicts six disciples coming to the master Pippalada with fuel in their hands, as who should say: "Give light! We are

ready to be enkindled!" The sage tried them, saying: "Remain yet a year in fervor, service of the Eternal, and faith. Ask whatever questions you will; if we know them we shall declare all to you!"

The first is: "Master, whence are all these beings brought forth?" The answer is an eloquent description of the World-soul, the Life, from which all beings come forth. In that answer, we come on the following remarkable passage, which strongly reminds us of the answer of King Pravahana:

"The year is a Lord of beings. His two paths are the southern and the northern. Therefore they who worship, thinking that it is fulfilled by sacrifice and gifts, win the lunar world. They verily return again. Therefore these sages who desire beings, turn to the south. For this is the path of substance, the path of the fathers.

"But they who by the northern way seek the Self by fervor, service of the Eternal, faith and knowledge, they verily win the sun. This is the home of lives; this is the immortal, fearless, supreme way. From it they do not return again."

This is, of course, exactly the antithesis in the teaching of King Pravahana. On the one hand, the way of self-seeking ritual, the way of the fathers, the lunar path, the way of Reincarnation. On the other, the way of pure aspiration, the way of the gods, the solar path, the way of full Liberation.

What this Liberation really meant to the teachers whose words we are translating, we can better understand from further answers in the same Prashna Upanishad. Thus the fourth question adressed to the Master Pippalada is:

"How many powers sleep in the man? How many wake in him? Who is the bright one that sees dreams? Whose is that bliss, and in whom are all these set firm?"

The Master answered him:

"As the rays of the sun at setting all become one in his shining orb, and when he rises they all come forth again; so all becomes one in the higher bright one, Mind.

"Therefore the man hears not, nor sees, nor smells, nor tastes, nor touches, nor speaks, nor takes, nor enjoys, nor puts forth, nor moves. He sleeps, they say....

"The life-fires verily wake in this dwelling....

"So this bright one in dream enjoys greatness. The seen, as seen he beholds again. What was heard he hears again. And what was enjoyed by the other powers he enjoys again by the other powers. The seen and unseen, heard and unheard, enjoyed and unenjoyed, real and unreal, he sees it all; as All he sees it.

"And when he is wrapped by the Radiance, the bright one no longer sees dreams. Then within him that bliss arises. And, dear, as the birds come to the tree to rest, so all this comes to rest in the higher Self....

"For this Self is the seer, toucher, hearer, smeller, taster, thinker, knower, doer, the perceiving spirit. And this is set firm in the supreme, unchanging Self.

"He reaches the unchanging Supreme who knows that shadowless, bodiless, bloodless, bright, unchanging One. He, dear, becomes all-knowing, becomes the All."

We come now to the fifth answer, in which the symbolism of the mystic syllable Om is interwoven with the teaching, in a manner which suggests the probably later Mandukya Upanishad. The fifth question is:

"He among men, who, to the end of his life, meditates on the mystic syllable Om,—what world will he gain by it?"

The Master answered him:

"This mystic syllable Om, is for the higher and lower Eternal. Therefore the wise man, by dwelling on this, reaches one of these: if he meditates on the first measure, enlightened by it, he is quickly reborn in the world....

"And if he dwells on it in his heart with two measures, he is led to the middle world by the liturgies. He wins the lunar world, and after enjoying brightness in the lunar world, he returns again.

"And he who with three measures meditates on the mystic Om, and thereby meditates on the supreme Spirit, is endowed with Radiance, with the sun; as a serpent is freed from its slough, he is, verily, freed from sin. He is led by the chants to the world of the Eternal. He beholds the indwelling spirit above the highest assemblage of lives."

"Yajnavalkya, what is the light of the Spirit of man?"

"The sun is his light, O king!" he answered. "With the sun as his light he rests, goes forth, does his work, and returns."

"This is so in truth, Yajnavalkya. But when the sun it set, Yajnavalkya, what is then the light of the Spirit of man?"

"The moon then becomes his light;" he answered. "With the moon as his light he rests, goes forth, does his work and returns."

"This is so in truth, Yajnavalkya. But when the sun it set, Yajnavalkya, and the moon is also set, what is then the light of the Spirit of man?"

"Fire then becomes his light;" he answered. "With fire as his light he rests, goes forth, does his work, and returns."

"This is so in truth, Yajnavalkya. But when the sun it set, Yajnavalkya, and the moon is also set, and the fire sinks down, what is then the light of the Spirit of man?"

"Voice then becomes his light;" he answered. "With voice as his light he rests, goes forth, does his work, and returns. Therefore in truth, O king, when a man cannot distinguish even his own hand, where a voice sounds, thither he approaches."

"This is so in truth, Yajnavalkya. But when the sun is set, Yajnavalkya, and the moon is also set, and the fire sinks down, and the voice is stilled, what is then the light of the Spirit of man?"

"The Soul then becomes his light," he answered. "With the Soul as his light he rests, goes forth, does his work, and returns."

"What is the Soul?"

"It is the Consciousness in the life-powers. It is the Light within the heart. This Spirit of man wanders through both worlds, yet remains unchanged. He seems only to be wrapt in imaginings. He seems only to revel in delights.

"When he enters into rest, the Spirit of man rises above this world and all things subject to death. For when the Spirit of man comes to birth and enters a body, he goes forth entangled in evils. But rising up at death, he puts all evils away.

"The Spirit of man has two dwelling-places: this world, and the other world. The borderland between them is third, the land of dreams. While he lingers in the borderland, the Spirit of man beholds both his dwellings, this world and the other world. And according as his advance is in the other world, gaining that advance the Spirit of man sees evils or delights.

"When the Spirit of man enters into rest, drawing his material from this all-containing world, felling the wood himself and him-

self building the dwelling, the Spirit of man enters into dream, through his own shining, through his own light. Thus doth the Spirit of man become his own light.

"There are no chariots there, nor steeds for chariots, nor roadways. The Spirit of man makes himself chariots, steeds for chariots, and roadways. Nor are any delights there, nor joys and rejoicings. The Spirit of man makes for himself delights and joys and rejoicings. There are no lotus ponds there, nor lakes and rivers. The Spirit of man makes for himself lotus ponds, lakes and rivers. For the Spirit of man is Creator.

"And there are these verses:

"Leaving the bodily world through the door of dream, the sleepless Spirit views the sleeping powers. Then clothed in radiance, returns to his own home, the gold-gleaming Genius, swan of everlasting.

"Guarding the nest beneath through the life-breath, the Spirit of man rises immortal above the nest. He soars immortal according to his desire, the gold-gleaming Genius, swan of everlasting.

"Soaring upward and downward in dreamland, the god makes manifold forms; now laughing and rejoicing with fair beauties, now beholding terrible things.

"They see his pleasure-ground, but him none see. Thus goes the saying: Let none awaken him that sleeps; for he is hard to heal, to whom the soul returns not.

"They also say that dream is a province of waking. For whatever he sees while awake, the same he sees in dream. Thus the Spirit of man becomes his own light.

"And when he has taken his ease in the resting-place of dream, moving to and fro, and beholding good and evil, the Spirit of man returns again by the same path, hurrying back to his former dwelling-place in the world of waking. But whatever the Spirit of man may behold there, returns not after him, for the Spirit of man is free, and nought adheres to the Spirit."

"This is so, in truth, Yajnavalkya. I give a thousand cattle to the teacher. But speak of the higher wisdom, that makes for Liberation."

"And when he has taken his pleasure in the waking world, moving to and fro and beholding good and evil, the Spirit of man returns again by the same path, hurrying back to dreamland.

"As a great fish swims along one bank of the river, and then along the other bank, first the eastern bank, and then the western,

so the Spirit of man moves through both worlds, the waking world and the dream world.

"Then as a falcon or an eagle, flying to and fro in the open sky and growing weary, folds his wings and sinks to rest, so of a truth the Spirit of man hastens to that world where, finding rest, he desires no desire and dreams no dream.

"And whatever he has dreamed, as that he was slain or oppressed, crushed by an elephant or fallen into an abyss, or whatever fear he beheld in the waking world, he knows now that it was from unwisdom. Like a god, like a king, he knows he is the All. This is his highest world.

"This is his highest joy. He has passed beyond all evil. This is his fearless form. And as one who is wrapt in the arms of the beloved, knows naught of what is without or within, so the Spirit of man wrapt round by the Spirit of Inspiration, knows naught of what is without or within. This is his perfect being. He has won his desire. The Soul is his desire. He is beyond desire. He has left sorrow behind.

"Here the father is father no more; nor the mother a mother; nor the worlds, worlds; here the scriptures are no longer scriptures; the thief is a thief no more; nor the murderer a murderer; nor the outcast an outcast; nor the baseborn, baseborn; the pilgrim is a pilgrim no more, nor the saint a saint. For the Spirit of man is not followed by good, he is not followed by evil. He has crossed over all the sorrows of the heart.

"The Spirit sees not; yet, seeing not, he sees. For the energy that dwelt in sight cannot cease, because it is everlasting. But there is no other besides the Spirit, or separate from him, for him to see. ....For only where there is separation may one see another, may one taste another, may one speak to another, may one hear another, may one touch another, may one know another. But the one Seer is undivided, like pure water. This, O king, is the world of the Eternal. This is the highest path. This is the highest treasure. This is the highest world. This is the highest bliss. All beings live on the fragments of this bliss.

"He who amongst men is rich and happy, a lord well endowed with all wealth, this is the highest bliss of mankind. But a hundredfold greater than the bliss of man is the bliss of the departed who have won paradise....and of him who has heard, who has risen from darkness, who is not stricken by desire. This is his highest bliss. This, O king, is the world of the Eternal!"

Thus spoke Yajnavalkya.

And the king replied: "I give the teacher a thousand cattle. But speak of the higher wisdom that makes for Liberation!"

And Yajnavalkya feared, thinking: "The wise king has cut me off from all retreat!" He said:

"And when he has taken his pleasure in dreamland, moving to and fro, and beholding good and evil, the Spirit of man returns again by the same path, hurrying back to his former dwelling-place in the world of waking.

"Then as a wagon heavy-laden might go halting and creaking, so the embodied soul goes halting, overburdened by the Spirit of Inspiration, when it has gone so far that a man is giving up the ghost.

"When he falls into weakness, whether it be through old age or sickness he falls into weakness, then like as a mango or the fruit of the wave-leafed fig or of the holy fig-tree is loosened from its stem, so the Spirit of man is loosed from these bodily members, and returns again by the same pathway to its former dwelling-place in the life.

"Then like as when the king is coming forth, the nobles, officers, charioteers and magistrates make ready to serve him with food and drink and shelter, saying: the king is coming forth, the king is at hand; so all the powers make ready to wait on the soul, saying: the soul is coming forth, the soul is at hand.

"And like as when the king will go forth, the nobles, officers, charioteers and magistrates gather about him; so verily at the time of the end all the life-powers gather round the soul, when it has gone so far that a man is giving up the ghost.

"When he falls into a swoon, as though he had lost his senses, the life-powers are gathering in round the soul; and the soul, taking them up together in their radiant substance, enters with them into the inner heart.....

"Then the point of the heart grows luminous, and when it has grown luminous, it lights the soul upon its way:....The soul becomes conscious and enters into Consciousness.

"Then his wisdom and works take him by the hand, and the knowledge gained of old. Then as a caterpillar when it comes to the end of a leaf, reaching forth to another foothold, draws itself over to it, so the soul, leaving the body, and putting off unwisdom, reaching another foothold there, draws itself over to it.

"As a worker in gold, taking an ornament, moulds it to another

form, new and fairer; so in truth the soul, leaving the body, and putting off unwisdom, makes for itself another form new and fairer: a form like the forms of departed souls, or of the seraphs, or of the gods, or of the creators, or of the Eternal, or of other beings.

"The soul of man is the Eternal. It is made of consciousness, it is made of feeling, it is made of life, it is made of vision, it is made of hearing; it is made of the earth, it is made of the waters, it is made of the air, it is made of the ether, it is made of the radiance and what is beyond the radiance; it is made of desire and what is beyond desire, it is made of wrath and what is beyond wrath, it is made of the law and what is beyond the law; it is made of the All. The soul is made of this world and of the other world.

"According as were his works and walk in life, so he becomes. He that does righteously becomes righteous. He that does evil becomes evil. He becomes holy through holy works and evil through evil.

"As they said of old: Man verily is formed of desire; as his desire is, so is his will; as his will is, so he works; and whatever work he does, in the likeness of it he grows.

"There is this verse:

"Through his past works he shall return once more to birth, entering whatever form his heart is set on. When he has received full measure of reward in paradise for the works he did, from that world he returns again to this, the world of works.

"Thus far of him who is under desire. Now as to him who is free from desire, who is beyond desire, who has gained his desire, for whom the Self is his desire. From him the life-powers do not depart. Growing one with the Eternal, he enters into the Eternal.

"There is this verse:

"When all desires that were hid in the heart are let go, the mortal becomes immortal, and reaches the Eternal.

"And like as the slough of a snake lies lifeless, cast upon an ant-hill, so lies his body, when the spirit of man rises up bodiless and immortal, as the Life, as the Eternal, as the Radiance."

"I give a thousand cattle to the teacher!" Thus spake Janaka, king of the Videhas.

There is this verse:

"The small old path that stretches far away has been found and followed by me. By it go the Seers who know the Eternal, rising up from this world to the heavenly world."

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A PHILOSOPHICAL ASPECT OF SCIENCE.

ONE of the earliest and most persistent efforts of the human mind has been that of finding some common basis in things, some receptacle to catch the stream of change: days and nights, this world, other worlds, life, death, decay, regeneration. To us it would be intolerable to accept the idea of a sieve-like universe, through which events poured into some inaccessible limbo, never to be recovered again. We expect things to be related, held together somehow, somewhere, in spite of apparent disruption, disappearance, or total loss.

On this expectation rests the whole procedure of knowledge, which for purposes of illustration I propose to confine to that involved in scientific methods.

Let us start with an experience. A certain combination of events gives me pain. Deep-seated in my organism is dread of pain and roughly speaking and in crudest terms, I am a being composed, for survival-fitness, of three factors: horror of pain, desire for pleasure, and some power of self-adjustment. Hence a painful experience is not merely suffering, but also learning; in striving to avoid, I strive to change the conditions of my world, and my will, however puny, is exerted to that end.

How much I manipulate it depends on my own structure, imagination, will. To a creature devoid, e. g., of locomotion, the range of adjustment is restricted. Almost passive, it suffers and succumbs, or chances to survive; but its range of pleasure, pain, or curiosity is limited as

well. The more complex the organism, the more complex the world of its reactions, interpretations and experiences. For instance, a burnt child dreads the fire, but its simple soul is satisfied to avoid the fire; it has as yet conceived no ambition to explore the mysteries of heat, of atmospheric pressure, and molecular activity!

These elementary remarks may introduce my thesis. I propose to urge: (1) that the accumulation of knowledge, the intricate structure of science, is ultimately for this purpose,—as far as may be to order and control life, and (2) that in so far as its formulations have achieved their aim, it has been by the use of abstraction. Incidentally we shall see how the naive mind is apt to accept these formulations as true in a sense which science is not concerned to assert, and which it could never achieve;—I mean accepts them as actual records of what is believed to be the real world, and revelations that reproduce the intimacies of Being.

But lest I should range over the whole field of knowledge let me restrict myself to the fortunes of some scientific hypotheses; and finally let me ask if truth in the above sense can ever be arrived at by science, and whether a decision in the negative necessarily amounts to skepticism.

You may remember the old Greek story of the atheist Diagoras, when he was shown over a temple to Poseidon, full of the olive offerings of sailors whom their prayers had saved from shipwreck. Unabashed he turned and said: "Show me rather the offerings of those who prayed and perished."

Is not our admiration for the successes of science somewhat similar and are not its failures erased from the records of its triumphs? Has it not as persistently disappointed the human craving for finality as the wildest fancies of philosophy? At how many points in its development have we not been tempted to think, "Here is finality,

here is the key to the inmost shrine," and found that we were still wandering in the antechambers of the labyrinth?

Let us briefly review the vicissitudes in the history of "matter." Newton defined matter thus: "It seems probable to me that God in the beginning formed matter in solid, massy, hard, impenetrable, movable particles. . .and that these primitive particles being solids are incomparably harder than any porous bodies compounded of them; even so hard as never to wear or break in pieces, no ordinary power being able to divide what God himself made one in the first creation." Thus atoms were absolutely inelastic, and according to the theory of essential disparity of matter and motion, they were *inert*. A third character, absolute *homogeneity*, was a necessary conclusion from the fact that all bodies, of whatever they were composed, were acted upon by gravity in exactly the same manner. Thus we have particles which are mathematically though not physically divisible, absolutely solid, inert and homogeneous.

Many experiments justified this definition. Did all? First, according to the kinetic theory of gases, solidity is impossible. In collision of ordinary bodies or particles, the practical loss of apparent motion is accounted for by the conversion of an unchanged quantum of energy into an internal agitation of the minute parts composing the colliding bodies. Atoms are by definition destitute of parts, hence in a collision of atoms, no such compensation is possible, and the physicist is faced with the alternatives, either of denying the solidity of atoms in the Newtonian sense, or of renouncing the principle of the conservation of energy. The first is preferred. To make a long story short, Newton's rigidity of atoms, like his theory of contact action —the only thoroughly mechanical explanation of the operations of one body upon another—proving inadequate, his mechanical atoms were replaced by dynamical ones.

As defined by Boscovich and the French School, an atom is no longer a substantial entity, but a mathematical point, a center of force, and "matter" is a crowd of such points, endowed with inertia and powers of attraction and repulsion.

Now the difficulty which beset Newton's theory of contact action, viz., how to explain "action at a distance," forced from him a descriptive apparatus, setting forth the behavior of related bodies, but not attempting to explain it. On his own atomic theory he could not do so. This apparatus was by Boscovich taken for reality;—he thus precisely inverted Newton's procedure. In Professor Ward's words, "The solid, primitive particles of various sizes and figures in which Newton believed, were rejected; and the inherent forces acting through a vacuum which he disclaimed as absurd, were accepted as the reality to which all the physical properties of matter were due."

But this inversion of the purely mechanical theory again raised difficulties. For to the "mass points" were attributed intrinsic force, a departure from the fundamental idea of the indifference of matter to motion, and also from the conception of force as something arising only in the relation of two bodies, not present in one alone.

Lord Kelvin's theory of vortex atoms was an endeavor to combine the mechanical and dynamical. Again to quote Professor Ward, "There is (in the kinetic theory) no action at a distance, but then there is no empty space: action and reaction are to be explained, not by impact, but by the physical continuity of the plenum. There are no hard atoms; yet the atom occupies space, and is elastic in virtue of its rotatory motion."

I must not spend much more time on this development of the new upon the almost total wreckage of the old. I will merely add that Kelvin's theory is moribund, too. For his theory called for a "homogeneous, incompressible, perfect

fluid" in which vortex atoms are rings formed by rotational movements. But how can mere disembodied motions possess inertia? As Maxwell says, "Though the primitive fluid is the only true matter according to the kinetic ideal ....yet that which we call matter is not the primitive fluid itself, but a mode of motion of that primitive fluid. In [this] theory, therefore, the mass of bodies requires explanation. We have to explain the inertia of what is only a mode of motion, and inertia is a property of matter, not of modes of motion."

To return once more to the older view of atoms, the theory of the homogeneity of matter issued in the definition of its parts as in all respects equal, viz., the atoms themselves remain as elements utterly devoid of finaltiy, or in Spencer's words, "The properties of the different elements result from difference of arrangement, arising by the compounding and recompounding of ultimate homogeneous units." But the science of chemistry is a denial of this, as we know. And what occupies the scientific field to-day as a theory of matter?

The old atom, either as a physically irreducible particle, or a point of force, has disappeared. In its stead there is a minute system of electrical charges, called electrons, positive and negative, say 68,000 of these constituting one atom, and separated by what is analogous to interstellar, interplanetary space. As Sir Oliver Lodge picturesquely puts it, the relative sizes of electron and atom may be gathered from this: Imagine an electron of one inch in size, your atom would be a mile and a half in diameter!

If Newton's atoms were imperceptible, these elemental and infinitely smaller bodies almost stagger the imagination. And with their advent for various reasons there comes again a disturbing doubt as to the validity of well-established scientific principles, such as conservation of

energy, and conservation of mass. But perhaps I have given concrete illustrations enough to show how over and over again the most fundamental "truths" of science have been superseded, buried under fresh growth.

Two points have perhaps been noticed:

1. The increasing tendency of science to recede in its formulations, from anything which could conceivably be a matter of actual sense experience; starting with solid particles, as a description of the basis of things, it tends to strip these of perceptible characters and to melt and fade the living, qualitative world into a mathematical scheme which is purely quantitative and abstract.

2. The fact that, in spite of this tendency, science is no mere cobweb of finely spun speculations, but is sharply checked and corrected by the very sense experience it apparently ignores.

How are these apparently contradictory facts compatible?

Science is no idle game, its unwearying speculations are inspired, sustained and tested by a single purpose, that of harmonizing and controlling life. This purpose may be defined from various points of view: e. g., from the esthetic, which rejoices in an interrelated and orderly system of thought; or the practical which seeks the ability to reproduce experiences, to widen the scope of life, increase the complexity of its relations perhaps, but above all to maintain existence with some degree of harmony and security.

Therefore science is justified if its methods succeed in realizing this ideal. The savage with his untutored mind, his superstitions, his investing of nature and the elements with erratic and wild powers, falls short of such security as we seek to possess. He knows his own capricious self, and his consistently anthropomorphic imagination attrib-

utes to his world just such caprice, — it is revengeful, changeable, wild, like himself.

But science de-humanizes the world. Whereas, in our indecisions, our caprice, our fluctuating wills, we are not unlike the savage still, yet our world, *for science,* is purged of all passions, all chance, all uncertainty. There is no minutest particle of matter, no faintest pulse of energy but is held or moved according to fixed immutable law. If e. g., an astronomical calculation is discarded, it is not because we suspect the solar system of capricious behavior, but ourselves of superficial observation, or mistaken interpretation. The great world stands fast in the absolute regularity of law, while we try again and again to formulate its secret.

But herein lies the strange paradox of science—we *control* life only by the partial abstraction from life. Science must abstract, in order that we may argue from one case to another. The abstract law which omits all the particular circumstances of every fact gains thereby applicability to fresh fact. The more phenomena it can relate under one law, the more successful is the law, and the permanence of any law is in direct proportion to its universality (cf. Poincaré on "Laws and Principles").

Suppose a given experiment x, in which there are a thousand factors, the influence of the stars, known and unknown, the light of day, the atmospheric conditions, actual governments among men, the various religions, etc., elements uncountable, and yet present. What does science do? The elimination of the irrelevant being its ideal, it clips and clears and ignores, till perhaps just one element remains, e. g., *weight*. The falling body x will move after one second, with an acceleration of 32 feet per second.

Another experiment is made,—with a totally different body y. Meanwhile the earth has whirled away through space, the daylight has gone, the stars in unfathomed re-

cesses of invisibility have changed their relation to our world, every element known and unknown is different in however slight and subtle a way; and yet, for gravity, body *y* falls to the earth exactly as did body *x*, there is no faintest fluctuation of inexorable sameness. For it a rock is precisely the equivalent of a living organism.

Look again at the history of science. Which have been the unstable hypotheses? Those which deal with more or less unimportant details of internal structure or with any subsidiary phenomena. As I have said, the more general and simple a so-called law is, the more is its permanence guaranteed, until like that of the conservation of energy it is put out of the reach of criticism, and is no longer a "law." but a "principle."

Scientists use every trick and expedient to leave this undisturbed. As it has been well put, "we postulate an *unknown supplement* of the experienced, in order to prevent facts from refuting a cherished assumption." Let me quote Professor Thomson: "In electrical phenomena we are brought into contact with cases of interaction between bodies charged with electricity, in which the action of the first on the second is not equal and opposite to the reaction of the second on the first. In such cases we suppose that both bodies are connected with the ether round them, and that Newton's third law holds when we consider the ether and the two bodies as constituting the system under examination. From this point of view, the potential energy of an electrical system may be regarded as due to its connection with an *invisible subsidiary* system, possessing kinetic energy equal in amount to the potential energy of the original system."

This is what I began by describing as a *receptacle* for all phenomena, a confine within which minor disturbances may be expected, but which itself is beyond the reach of such disturbance. I do not withdraw my assertion that

science is checked by sense experience, and in minor matters it is constantly being transformed. But sense experience is aided and harmonized by nothing so effectively as by these more general principles. Hence we refuse to quarrel with their bleak and lifeless abstraction. We see then how such apparently disrespectful juggling with so-called "fact" is justified. It is justified because it allows us to reproduce, modify, predict, certain groups of experiences at will, and this is the supreme end and aim of science: control.

Look at what Aristotle called the ἴδιαι ἀρχαί, or special principles of the sciences. According to him they were irreducible to one another, and we have not disproved his contention. Biology and physics do not wholly agree. Euclidean space and non-Euclidean or curved space each possesses its special space-relations, and axioms in the one system become absurdities in the other. A more intimate instance is this,—the atomic hypothesis as to the nature of matter is not reducible to a mathematical hypothesis, yet they both lead to successful manipulations of the real. In our theoretical world the lion and the lamb lie down together; so long as the various theories succeed in controlling those portions of our experience assigned to them, why should we be over-particular in a demand that they shall all be convertible into the same formula or hypothesis?

You will remember that I spoke of Newton's atomic theory as having "proved inadequate." I hope I have made myself clear as to what I mean by that word. A theory may be beautifully consistent with itself and yet be inadequate in the sense I have tried to describe. Let me add another illustration. A theory is not discarded out of mere caprice; like the Ptolemaic system, a formulation may work perfectly well until a widening experience brings in so many fresh factors that any calculation which includes

them becomes too cumbersome for convenient use. Then is the moment for such scientific upheavals as that involved in passing from the Ptolemaic to the Copernican system. The facts observed and classified in the old order yesterday, assemble to-day under new names and with reversed rank. Yesterday the earth was central, to-day the sun is the point of reference for the whole solar system. Nothing has fallen out of the heavens; the planets and stars remain in their old places, but we describe their relations differently, and this altered description is forced from us by their behavior. The alteration justifies itself, because it enables us to calculate and predict with increased facility and success.

The first two objects of this paper I have laid before you:

1. The fact that scientific procedure is purposive, its end and justification, control of our experience.

2. And that to attain this control it must be abstract, eliminating whatever is irrelevant to the special purpose in view.

Finally I proposed to ask whether science can be said to penetrate into the very heart of Being,—reproducing its true nature?

Let us put the question in this form: Is it true that in the objective world which goes on its way more or less regardless of me and my science, is it literally true that there are atoms, electrons, perfect fluids, ethers, etc. etc.? It seems to me there is only one answer: we do not know; we know no more than the merest savage. By a curious paradoxical trick, we have so defined our world as to put it quite beyond the reach of refutation by sense-experience. We assert of it, and minutely describe parts of whose individual nature we can never, *ex hypothesi,* have actual sensible experience, as of one individual with another.

Suppose a solar giant with short sight who required a

crowd composed of nearly all the inhabitants of Europe before he could even see it at all. He might by some happy guess suggest that its black mass was composed of atoms, but how far would you as one of the component atoms admit that this giant really knew anything about you?

For science treats of bare averages, and we know not how far the exactness of its (minor) laws would go unchallenged if they took account of individual changes among infinitesimal bodies.

Think of how peculiarly erratic we are in our methods. We so define the real constitution of matter as to shut ourselves out from any possible knowledge of it, in the sense I have tried to describe. We lay down the law of the conservation of energy, let me say arbitrarily, and this law is based on what assumptions? First, that from our tiny corner of this immense world, we can by analogy infer with accuracy the nature of all the vast remainder; secondly, that the tiny corner plus the vast remainder together possess a certain finite though unknown sum of energy, and that this sum is absolutely constant. By what right do I make such assumptions? Take another instance. Although the law of causality is gradually being extruded from science which more and more contents itself with mere description, it still has a very respectable reputation. But is it an accurate law? What it asserts is this: reproduce all the conditions of a certain phenomenon, that phenomenon will reappear. But the conditions never can be reproduced, not in countless billions of cycles; for admitting the bold assumption that almost every factor can be reproduced, the conditions would at any rate be assembled in another time. And by what right do we assume that another time has no effect upon the rest of the conditions? none upon the resultant phenomenon? Strictly speaking by no right whatever.

There is another disheartening weakness of science:

do what we may we never seem to know the thing examined, in its very intimacy,—everything is ultimately defined by what it does to something else. Mass is defined in terms of force, force in terms of mass. Space is relative, so is time. Motion is known not as absolute, but as something which arises out of relation. Body A might whirl away through empty space for ever and not be in motion in the sense of perceiving it, or being perceived as moving. Add body B, whirling faster or slower, and the phenomenon of motion emerges.

Of space Poincaré says: "It is impossible to imagine pure empty space. . . ."; "whoever speaks of absolute space, uses words devoid of meaning. . . ."

"For example I am at a certain point in Paris, the Place du Panthéon, and I say I will come back *here* to-morrow. If I am asked, do you mean you will return to the same point in space? I shall be tempted to answer 'Yes'; and yet I should be wrong in saying so. For between now and to-morrow the earth, carrying with it the Place du Panthéon, will have traveled more than two million kilometers. If I wish to be precise, this fact does not help me. For these two million kilometers have been traveled by our earth in relation to the sun. The sun again is in motion relatively to the Milky Way, and the Milky Way itself is doubtless moving though with a rapidity inaccessible to our knowledge. Thus we are in complete ignorance, and shall always be so, of exactly how much the Place du Panthéon moves in one day. What I should say is this: To-morrow I shall again see the dome of the Panthéon, and if there were no such dome, my phrase would be meaningless and space would vanish."

He gives another illustration, that of Delboeuf:

"Suppose that in one night all the dimensions of the universe increased one thousand times, what would be my sensations the next morning? I should be aware of no

change whatever. For all the relations of one thing to another would have retained their precise proportions, and I should remain forever in ignorance of this titanic transformation."

I hope all these examples have not been confusing. I have merely tried to point out that to serious thought it is impossible to accept naively the concepts of science, accept them I mean as the true counterparts, in thought, of what goes on in the real objective world.

It cannot be put better than by Prof. Thomson, in his brilliant dictum, "Scientific theory is a policy not a creed." Must we turn skeptics, must we believe that all effort really to know is futile, bound to ultimate failure? I think not. Let us forget all that we have been criticising for a moment, and simply see what really takes place, when in the light of scientific directions as to temperature, atmospheric pressure, etc., I try to boil an egg. I may need the latest refinements of physics to effect my purpose, but they are ultimately tested by the fact that my egg *does* boil, and that their use leads to a satisfying breakfast.

All I wish and need is to carry out my purpose. If I find it easier to bring about a desired complex of relations by treating my world *as if* it swarmed with electrons, then I say "it is constituted thus." But I need not believe the electrons in my scientific imagination have a real counterpart *in what actually goes on.*

If I can penetrate into the universe by these methods, then we may say in a very profound sense, that we do understand it. Our formulations will forever fail if we demand of them actual reproduction of the unending richness and complexity of even our minute plot of this unmeasured universe. They will not fail, if we understand that they are instruments and symbols and not reproductions, and ask of them only assistance in harmonizing and integrating our experience. And so the lesson of the in-

stability of scientific theories is not necessarily a skeptical one, and at the risk of repetition let me emphasize this point. I say that the transformations of scientific theory do not necessarily lead to skeptical conclusions. And why? For two reasons: First, because they are not random, but *progressive,* because they always mean more successful control of experience; secondly, because they are not merely capricious and fanciful, but *rather are forced from us by the world with which we deal.* Though it is sometimes friendly in allowing our intimacy, amiable in appropriating some of our interpretations, it is merciless in punishing stupidity, and with "nature" ignorance is crime. The punishment is always a signal for a readjustment of what hitherto we have asserted as true.

The progress of science might be described as a series of successes and failures on an ascending curve. No failure means a total collapse of knowledge, no success is ever complete. But the proportion of success to failure is encouraging and allows us to conclude that the outer world of reality is not beyond the measure of our understanding. But if we are not led to skepticism neither are we given absolute certainty. There is no incontrovertible proof that the sequences of nature, of days and nights, or of our own thoughts as we know them, will ever return.

The two main types of mind in the world, the optimistic and pessimistic, will emphasize the one fact or the other, the successes of yesterday, or the uncertainty of to-morrow. Meanwhile science lives by constant readjustment, finding in its growing success and control the hope, no matter how distant it may be, of some ultimate consummation.

G. O. WARREN.

BOSTON, MASS.

THE ROCK OF AGES.

THE nature of science is much misunderstood even by scientists of rank, and as a result theories such as agnosticism, pluralism, pragmatism, humanism, etc., make their appearance. The truth is that the conception of science as a method, as a systematic plan of investigation, as a consistent principle of arranging facts in order, has not as yet become common property among our main investigators, and there is a notion afloat of the haphazard character of scientific research.

Mrs. Fiske Warren, whose article "A Philosophical Aspect of Science" appears elsewhere in this issue, is an instance of this tendency. She studied four years at Oxford, taking the full philosophical course with teachers representing opposing schools of philosophical thought. She is introduced to us by Professor William James who speaks of her in the highest terms.

Mrs. Fiske Warren's conception of science is by no means isolated. In a lucid way she summarizes and ably represents the view common among many scientists, and from this standpoint it almost appears a kindness toward science, this inadequate mode of research, to look upon its future with indulgence and suppress the pessimism of despair. In spite of the many drawbacks of science, Mrs. Warren advocates a conditional optimism which is to comfort us for the loss of our illusion.

Note that in her conception the progress of science "might be described in a series of successes and failures

on an ascending curve; no failure means a total collapse of knowledge, no success is ever complete." Thus she places scientific solutions on a level with haphazard probabilities, but even in doing this she ignores the fact that the simile here used is based on the conception of a mathematical curve which would definitely predetermine the progress of science. The development of science is no less subject to law than the growth of animals and plants, the crystallizations of minerals, yea, the formation of whole solar systems. This does not prove as yet, but indicates, that science is not comparable to any haphazard mode of hitting the bull's eye and does not depend on incidental successes, harboring the failures also in its own nature as if they were part and parcel of science itself and did not belong to the struggles of poor mortal and fallible scientists who fail to attain an insight into her nature.

When Mrs. Fiske Warren calls her position "a philosophical conception of science," I must demur, for I hold that her views are unphilosophical and even antiphilosophical; they are pluralistic. Philosophy has always endeavored to trace the unity of our conception of the world, and a pluralistic philosophy which, while clinging to particulars and to individual facts, denies unity and scorns system as pure theory is practically a surrender of the ideal of philosophical thought and implies, to say the least, a suggestion that science is impossible and that the light of science is a mere will-o'-the-wisp.

METHOD THE ESSENTIAL FEATURE OF SCIENCE.

Science is a method of inquiry and as such it means system. The results of science are systematically formulated universalities, i. e., groups of facts of the same character described in their essential nature, singling out the determinant features and omitting all the rest. Such a formula describing a definite set of facts is called a natural

law, and I will say here incidentally that what Mrs. Warren says concerning the nature of abstraction is quite correct, although she might have better characterized the nature of abstraction if she had borne in mind the significance of the formal sciences, especially logic and mathematics, which play such an important part in abstraction, furnishing the backbone of what we call system in science.

We feel prompted to make a few further comments on the importance of abstraction, for he who truly understands the nature of abstraction can no longer cling to a pluralistic conception either in science or philosophy.

Abstraction singles out some definite features and drops all others. An abstraction is mind-made but it represents a real quality of objective things. People who speak of "empty abstractions" with a view of detracting from their significance know not what they say and only exhibit their own lack of judgment. Abstraction is the scepter with which man rules nature, for by the means of abstraction we recognize the common features of things, classify them as general concepts, and learn to formulate the uniformities of nature, commonly called "natural laws."

The very existence of abstraction proves that generalization is possible and the mere possibility of generalization is an evidence that there are general types, and reason is justified in trusting to logic, arithmetic and mathematics when dealing with facts of the objective world.

Man is the only living being on earth who can make abstractions, for the organ needed to think of whiteness and not of white snow or other white things, to conceive of numbers by counting things and omitting all qualities of the things counted except their presence as items, presupposes the use of words which serve as spoken symbols for things or their qualities and the faculty of making abstractions, of comprising many sense-impressions into general concepts, and of classifying them into a system of

genera and species, is called reason. The speaking animal becomes a rational animal and the rational animal alone can form abstractions, while a methodical use of abstractions establishes science.

A formula describing a definite set of facts is a scientific acquisition which (nothwithstanding Mrs. Warren's statement to the contrary) is a success, complete in its special field. The three Kepler laws, for instance, are a definite and complete solution of the problem of the movements of heavenly bodies. While it is true that the attempts to interpret these facts of nature were failures, of which many were by no means a "total collapse of knowledge," it would be a great mistake to imagine that Kepler had only succeeded in a limited way, and that we had to wait for further facts in order to verify his three laws, or even to expect them to be upset or at least modified by our increase of knowledge.

Science is not a collection of more or less verified hypotheses. It is not an aggregate of mere probabilities. Science is a method of determining the truth, and in spite of the many gaps in our comprehension it offers us a well guaranteed fund of knowledge.

It is characteristic of a conception of science such as underlies Mrs. Fiske Warren's presentation of the case that no distinction is made between theory and well ascertained knowledge of facts. Note the instances which our author adduces to prove her case. She selects for the purpose a brief review of the vicissitudes of the history of matter, a problem which even to-day is not yet ripe for solution. She presents to us a number of hypotheses, not to say vagaries, of prominent scientists.

THEORIES AND TRUTHS.

Newton formulated the law of gravitation in his *Principia,* and this is Newton's immortal work, but otherwise

his significance as a scientist is greatly overrated. Bear in mind Schopenhauer's strictures[1] that Newton's fame is based on the statement of a theory which was first pronounced by Hooke, whose claim in this case he ignored with persistent narrowness.[2] Note Newton's childish ideas concerning the meaning of the Revelation of St. John, his exaggerated high opinion of these his theological views, and you will understand that his notions concerning the ultimate constitution of matter cannot be treated seriously as possessing any scientific value. They are theories based upon insufficient data, or we might almost say on pure imagination. Though Newton's *Principia* is of great importance as a definite formulation of the solution of a problem which had been matured in his time, to present his views of matter as a contribution to science is quite misleading.

When Lord Kelvin visited America he was interviewed by a sage newspaper reporter who wanted an authoritative statement concerning his view of the vortex theory, and Lord Kelvin who had probably been often bored by similar requests simply answered, "It is a mere theory," and so the reporter indulged in extravagant language as to the modesty of the English scientist who spoke of his most famous discovery as a mere hypothesis. The truth is that it was a mere hypothesis, for it is not yet a formula covering facts. It is the attempt to explain certain facts for which we have not yet enough data. That Lord Kelvin's theory is not only ingenious, but that it is very helpful, is conceded by all who utilize his suggestion as a working

[1] *Welt a. d. V.*, I, 25; II, 58, 86 (2d ed., 88). The dispute anent the priority of the invention of the integral in mathematics might find a true solution in the proposition that the first idea came from Leibnitz's fertile brain, to whom it was suggested by his monadology, the theory of infinitesimal particles, while Newton appears to have applied it to the computation of gravitating bodies and thus reduced it to exact mathematical concepts. Dühring in his *Kritische Geschichte der Philosophie*, pp. 353, is inclined to side with Newton against Leibnitz.

[2] See *Enc. Brit., s. v.* "Newton," XVII, 440 ff.

hypothesis and to speak of it as "moribund," creates the suspicion that Mrs. Warren has not grasped its real significance.

There is a difference between theory and truth which is this: A theory is a tentative statement of a truth; it is a working hypothesis, temporarily made and awaiting verification, while a truth is a description of a certain set of features or of an interrelation of phenomena which covers the entire range of facts.

THE LAW OF CAUSATION.

As an important misconception we will mention Mrs. Fiske Warren's interpretation of causality. She speaks of "the law of causality" as "gradually being excluded from science, which more and more contents itself with description." She says, "it still has a respectable reputation. But is it an accurate law? What it asserts is this: Reproduce all the conditions of a certain phenomenon, that phenomenon will reappear." It would lead too far to here renew the discussion of the law of causality. I will only refer to former expositions of mine, especially in discussions with Professor Ernst Mach.[3]

The law of causation has not been replaced by description. It has always been description, except that the term "description" was not introduced until Kirchhoff defined mechanics as an exhaustive and concise description of motion. What Kirchhoff eliminates is the notion of metaphysical factors behind motion, which have sometimes been dignified with the name "cause," but the scholars who used this metaphysical name "cause" did not mean cause at all; they meant "reason," and their notion of reason was based on a distorted view of natural law which then

[3] *The Surd of Metaphysics*, pp. 119-130. Cf. "Mach's Philosophy," *Monist*, XVI, 350-352. See also *Fundamental Problems*, 79-109; and *Primer of Philosophy*, 137-172. For a treatment of the Hume-Kantian problem of causation, see *Kant's Prolegomena*, especially pp. 198 ff.

was not conceived as a uniformity but as a metaphysical entity behind phenomena.

In former discussions of the problem of causation I have pointed out that "a cause" is always a motion, an event, an occurrence, which in a system of conditions changes the arrangement, and results in a new state of things commonly called "the effect." Accordingly the law of cause and effect is the law of transformation. It describes a series of successive changes, the start of which in the system of our investigation we call "a cause," the end "an effect"; and it goes without saying that the effect in its turn may again be a cause, and we thus have a succession of changes which represent causes and effects in an interlinked concatenation.

Without going into further details, I will only say that Hume's famous investigations of causation have missed the mark in so far as he defined cause and effect as "objects following each other," instead of treating them as two phases of one and the same process; thus he could not understand the necessary connection between strychnine and the dead mouse.

After all, the law of causation is not being excluded from science. It is nothing more nor less than another aspect of the famous law of the conservation of matter and energy.

Speaking of the law of the conservation of matter we must bear in mind that matter is to be used in the more general sense of substance, not in its limited definition of mass and volume; for certain facts, now well established, teach us to look upon ponderable matter as subject to origin and destruction. We have reasons to assume that new matter originates in some nebulas of the starry heavens, in due succession of the Mendeljeff series, according to their atomic weight, while the discovery of radium suggests a final dissolubility of chemical atoms. The new view does

not upset the law of conservation of substance, for we assume that the elements thus formed in the celestial retorts of nebulas are due to a condensation of the ether, or whatever name we may give to the primordial world-stuff.

POINTS OF REFERENCE.

If the law of causation were really what Mrs. Fiske Warren says it is, viz., "Reproduce all conditions of a certain phenomenon, that phenomenon will reappear," it would be useless even as a working hypothesis; for, as Mrs. Warren truly explains, we can never reproduce the very same conditions the second time, and this she proclaims in the most exaggerated terms in spite of her former explanation of the significance of abstraction. Our method of science consists in eliminating all accidentals and confining the attention to essential features. In order to prove her case she, following the example of Poincaré, points out some accidental features and thus shows that the repetition of the same event is impossible.

Poincaré here makes the same mistake into which Herbert Spencer falls in his *First Principles*, where he attempts to prove that the simplest phenomena of motion are unknowable. He succeeds only by a blunder. He omits the first essential condition of describing a motion,—he leaves out a point of reference. If a captain walks on deck of his ship, from east to west and the ship is moving in the opposite direction at the same rate, is he moving or standing still? This conundrum is produced only by muddling up the issues and projecting our own confusion into the world of objective facts. If I promise to return to the Pantheon in Paris on a certain day and hour, I mean that place with reference to our geography and not the very same spot in the solar system or even the stellar universe. The very definition of the hour and day implies incidentally

a changed position of the earth with reference to the sun, and the identity of the spot is determined by the accepted meaning of language; the introduction of astronomical relations would be mere quibbling.

THE STABILITY OF TRUTH.

In conclusion I will say: It is not true that "over and over again the fundamental 'truths' have been superseded and buried under fresh growth." The real truths of science, the uniformities of nature, are descriptions of the essential features of certain sets of facts, methodically systematized. They are never superseded, but each of them constitutes a κτῆμα ἐς ἀεί, a possession that has come to stay, and which will be useful as a foundation for further inquiry.[4]

The reason why there is a lack of appreciation of the systematic nature of science, is most likely due to a lack of philosophic training, which in its turn is due to the prevalence of metaphysical and other faulty philosophies such as are sometimes taught even in the foremost and most renowned universities. In order to understand the systematic character of science we must learn to appreciate the paramount significance of form and formal thought, for here lies the real problem of the foundation of science.

The formal sciences give us a key to nature; they enable us to construct systems of reference which can be utilized for describing events under observation in terms of measuring and counting, or, generally speaking, by a description of their formal relations. The formal element in thought as well as in objective reality is the connecting link that overbridges the chasm between subject and ob-

[4] A summary of the author's view is stated very briefly in the introduction to the little book *Philosophy as a Science*, published by the Open Court Publishing Company.

ject and which furnishes us with the key by which we may scientifically comprehend nature.

The view here presented appears to me as the only tenable interpretation of the nature of science. Neither the extreme empiricists nor the Kantian school have offered a satisfactory solution. The empiricists who are at present in the ascendancy fail to see the systematic nature of science, and the Kantian school had the misfortune of finding a wrong expounder to the English speaking world in the philosopher Hamilton. His misconstruction of the Kantian *a priori* changed the Kantian school in England into a metaphysical philosophy involving some inferences which were quite foreign to Kant himself.

The empiricists on the other hand, having a wrong conception of Kant's *a priori*, lost the truth of his philosophy, and instead of understanding the nature of certitude, of consistency, of a systematic method, they produced a kind of evidence by accumulation of details, thereby missing the essential and characteristic point of science. The only foundation of science is to be sought in a philosophy of pure form.

SYSTEM THE AIM OF SCIENCE.

System is the backbone of science, and system is the result of the formal sciences. The latter have been gained through abstraction and constitute what is commonly called "reason." The purely formal aspect of things makes it possible to create purely formal systems of thought such as arithmetic, geometry, and logic. They are *a priori* in the Kantian sense. They are subjective or purely mental, but serve as models for any object of investigation, be it purely imaginary or actual, merely possible, potential or real, and thus they can be used as means of reference for describing any existence, real or imaginary, which is dominated by consistency. Consistency in the realm of the

purely formal sciences produces that wonderful harmony which we observe for instance in mathematics. Consistency in nature produces what in a former article we have called lawdom,[5] a state of things called in German *Gesetzmässigkeit,* which makes it possible for certain facts of the same class to be described as uniformities. Consistency in action renders possible the rationality of living creatures, enabling them to exercise choice, to make plans, and carry out purposes.

Though many scientists look upon science, in the light of Hume's skepticism, as the result of good chances, of mere lucky haphazard successes, there is developing in the present age a deeply rooted confidence that science is more than the result of accidental guesses, and we believe that we have produced the evidence of the attainment of scientific certitude, the foundation of which is laid in the philosophy of form.

But this confidence is of a broader nature and of a more ancient date than is commonly granted. This same confidence has accompanied man from the dawn of his rationality and has found expression in his religion. The world was never a chaos to man, but always the law-ordained cosmos, and this feature of cosmic order was pictured in man's religion as a belief in a divinity of some kind, mostly as a hierarchy of gods, and, in the theistic stage of religious development, simply as God.

Religion accordingly appears in this conception as an instinctive formulation of a trust in the world-order, and this world-order, which the philosophy of form has been able to trace, constitutes the bed-rock of all our thoughts and aspirations in religion as well as in science. In this sense we can truly say that here lies the Rock of Ages.

EDITOR.

[5] See *The Monist,* XX, p. 36.

THE PSYCHOLOGICAL BASIS OF RELIGION.

IN the discussions of religion, whether technical or popular, one frequently comes upon expressions such as the religious nature of man, the religious sense, the religious impulse, the religious instinct. But upon careful analysis, it is exceedingly difficult to discover that any of these expressions are used with precision or consistency. In this respect the professional psychologists are scarcely more satisfactory than the theologians. The tendency, however, of the psychologists is to establish a definition of terms which simplifies the task of determining whether religion is to be described by these terms. For example, it is clear that religion cannot be ascribed to any unique faculty for the simple reason that modern psychology does not recognize the existence of unique faculties of any kind. Neither can it be called a "sense," for the term sense is limited to those organic functions which are known as the sense of sight, hearing, pressure, temperature, and the rest. In the same way the words impulse and instinct are gradually attaining a specific usage which in the nature of the case precludes their application to religion. Both impulse and instinct are employed more and more to signify motor reactions; impulse indicating the dynamic, spontaneous character of an act, and instinct referring also to the organization of movements in the attainment of definite ends or in manifesting characteristic attitudes, such as fear. Thus the random movements of the infant express impulses, but grasping and sucking are usually classed as instincts. Certainly religion is not a motor reaction of this type.

The phrase religious consciousness seems more promising, but this is largely because the word consciousness is inclusive enough and sufficiently flexible to escape the objections made against the other terms. Whatever else religion may be, it is some form of consciousness. This is the most general term which psychology employs, and therefore to speak of the religious consciousness puts the whole burden back upon the adjective religious, and we scarcely get nearer a solution of the problem than before, except that we have a designation for our subject which is not beset by conflicting or confusing usage. The question is then, What is the psychological basis and nature of the religious consciousness?

It may add force to the question to recall that for functional psychology there is an indefinite variety of types of consciousness—art consciousness, scientific consciousness, civic consciousness, masculine consciousness, feminine consciousness, race consciousness, class consciousness. Each profession, trade, locality, family, or other group having common interests tends to develop a consciousness in which every member shares more or less keenly. One feels the reality and force of these different kinds of consciousness as one converses with men who possess them, men of different professions and persons from different sections of the country. Or, again, one immediately experiences for himself the contrasted mental attitudes and psychical functions when, in the course of the day, he goes from his study to the dining-room, to the tennis court, to the business street, to the hospital, to the concert, to the place of worship. All these forms of consciousness are definite and describable, and one is as real and as tangible as another. They are manifestations of interests, of habits, of customs. We never doubt their reality as genuine experiences, and we do not question that activities which we only observe, without actively sharing,

involve definite forms of consciousness for those engaged in them. Because I do not play golf, I cannot deny that there is such a thing as golf consciousness in those I observe pounding the white balls over the green turf on a torrid day or eagerly discussing at dinner the drives and foozles of their afternoon sport. This golf consciousness is something in its own right. It is different from tennis consciousness or bridge consciousness. It develops its own social institutions, its heroes, its literature, its code of etiquette, its advocates, its apologists, and its fanatics. Taken in some such objective way, the religious consciousness is obviously a tremendous reality in all races and peoples. It is represented everywhere by ceremonials, temples, sacred places, priests, traditions, saints and sages.

The definitions of this religious consciousness are notoriously various and partial. They represent special phases or stages of religious experience. In intellectual terms it is identified with the belief in spirits, in the supernatural, in the infinite; in terms of feeling, it is an emotion, the feeling of dependence, the feeling of fear; in terms of the will it is a set of desires and of organized habits. This diversity, representing different philosophical and temperamental standpoints, has led Höffding to assert that the definition of religion is largely a matter of taste.

The statement offered here is, therefore, presented only as a working suggestion to indicate at once the general point of view and something of the scope of the religious consciousness. First, religion, or the religious consciousness, expresses man's craving for life and attaches supreme importance to those objects and activities upon which the maintenance and furtherance of his life depend; second, the religious consciousness is social in its nature, involving the welfare of the group and enveloping the mind and will of the individual in a body of inherited custom. The elaboration of these two propositions will show

more fully what they signify. It will be convenient to draw illustrations from primitive as well as developed forms of religion. Use is made of primitive religions in this connection because in them the phenomena are simpler and are less complicated by the overgrowths and divergent interests of civilization. Besides, the evolution of the higher types of religion from these earlier stages is so obvious to the student of the history of society that he sees in the general structure and framework of primitive religion the main features of the later growths.

Take, then, the first proposition that the religious consciousness expresses man's craving for life and attaches supreme importance to those objects and activities upon which the maintenance and furtherance of his life are felt to depend. The most casual observer of religious phenomena must be impressed with the fact that religion takes itself with the utmost seriousness. It regards its practices and customs as matters involving the very sources and conditions of life. Throughout the Bible, which in this respect expresses the keynote of religion everywhere, the assurance is that those who do the things enjoined shall live and prosper, while those who refuse or neglect to do them shall surely die.

After the law of the ten commandments the injunction is added: "Ye shall walk in all the way which the Lord your God hath commanded you, that ye may live, and that it may be well with you, and that ye may prolong your days in the land which ye shall possess. Hear therefore, O Israel, and observe to do it; that it may be well with thee, and that ye may increase mightily, as the Lord, the God of thy fathers, hath promised unto thee, in a land flowing with milk and honey." There are also many passages like the following: "Trust in the Lord, and do good; so shalt thou dwell in the land, and verily thou shalt be fed. Delight thy-

self also in the Lord; and he shall give thee the desires of thine heart."

Religion is thus an expression of the most elemental demand of the human being—the demand for existence, for welfare, for success. It exalts those functions, habits, objects, and customs which are felt to further life and warns against whatever threatens it. Religion is identical with the central biological impulse; with the will to live, to affirm, to grow. It is natural, therefore, that the basal instincts of human nature should be conspicuous and controlling factors in religion, and the evidence is abundant that this is the case. This is particularly clear in primitive races where the fundamental instinctive reactions are preserved in the ceremonials without qualification or apology. The instinctive reactions are those involved in preserving, perpetuating, and protecting life. They are the instincts of getting food, of reproduction, and of resisting and escaping danger.

The ceremonials are in large part the reproduction of actions and situations experienced in the actual life of food getting, courtship and war. If a people has totems, those totems are the familiar animals and plants of the environment. They are or have been the staples of food, of subsistence. The totems of Australia and of North America are the commonplace necessities of life in those countries. And the ceremonial of the totem, whether of fish or flower, consists of dancing and mimetic movements typical of the habits of the species. The leader usually wears a head gear and his body is painted to make him resemble the totem.

Spencer and Gillen give the following description of the initiation ceremony of the eagle-hawk totem in Central Australia. It was performed by two men, supposed to be two eagle-hawks quarreling over a piece of flesh, represented by the downy mass in one man's mouth. "At first

they remained squatting on their shields, moving their arms up and down, and continuing this action which was supposed to represent the flapping of wings, they jumped off the shields and with their bodies bent up and arms extended and flapping, began circling round each other as if each were afraid of coming to close quarters. Then they stopped and moved a step or two at a time, first to one side and then to the other, until finally they came to close quarters and began fighting with their heads for the possession of the piece of meat. This went on for some time, and then two men stepped out from amongst the audience and took away the Churinga (sacred sticks used in the head dress) which were a great weight and must have caused a considerable strain on the head, especially in the great heat of the afternoon sun, for it must be remembered that it was now well on into the summer. Then once more they began going round and round each other flapping wings, jumping up and falling back just like fighting birds, until finally they again came to close quarters, and the attacking man at length seized with his teeth the piece of meat and wrenched it out of the other man's mouth."[1]

The ceremony of the plum-tree totem was acted by four men in the following way. "First of all one man came up to where the audience was sitting by the *Parra* (a mound of earth). He pretended to knock plums down and to eat them, and after a short time he sat down amongst the audience. Then two others came up, one of whom remained standing, while he knocked down imaginary plums, which were eaten by the other man, who seated himself on the ground. This over, both of the men went and joined the audience, and the fourth man came and went through the same pretence of knocking down and eating plums."[2]

[1] Spencer and Gillen: *The Native Tribes of Central Australia*, p. 296.

[2] Spencer and Gillen, *Ibid.*, p. 320.

time of marriage, elaborate ceremonies are observed to remove the taboos between the sexes, and to insure the fruitfulness of the union. The bride and groom are accompanied by processions to ward off evil influences. Nuts, flour or rice may be thrown upon them. Various means of concealment are employed to thwart the evil eye. For this, disguises and veils are employed, and in many countries, the bridegroom never sees the bride until the marriage is consummated. Obligatory customs are also universal with reference to childbirth. The newborn child and the mother are taboo and are secluded from the camp until a period of time has elapsed during which the prescribed observances must be faithfully kept. One scarcely needs to refer to the perversions and exaggerations of this sex principle which have often characterized religious customs. The extent of Phallic worship and sacred harlotry are, however, evidences of the fact that religion has been liable to abnormal developments through elements native to it.

In these two respects, then, religion shows itself to be the manifestation of the affirmation and consecration of life: the chief objects of food and the activities concerned with them are sacred and so also are the organs and the functions of sex.

The second proposition is that the religious consciousness is social in its nature and concerns the welfare of the group. Here, again, the fact is clearly illustrated in primitive peoples. Their solidarity within the tribal group is well understood. It was not a consciously attained and rationally sustained social life, but it was so real that every important concern was an affair of the group. So close and so literal was this tribal organism that the whole of it was involved in the deeds of every individual. This is familiarly illustrated by the law of blood revenge, by which the whole tribe was held responsible for the misdeeds of any member. Dudley Kidd characterizes this solidarity

among the Kafirs as follows: "A Kafir feels that the 'frame that binds him in' extends to the clan. The sense of solidarity of the family in Europe is thin and feeble compared to the full-blooded sense of corporate union of the Kafir clan. The claims of the clan entirely swamp the rights of the individual. The system of tribal solidarity, which has worked so well in its smoothness that it might satisfy the utmost dreams of the socialist, is a standing proof of the sense of corporate union of the clan. In olden days a man did not have any feeling of personal injury when a chief made him work for white men and then told him to give all or nearly all, of his wages to his chief; the money was kept within the clan, and what was the good of the clan was the good of the individual and *vice versa*."

Religion is the supreme expression of this social consciousness. All of its ceremonials are corporate in character, being conducted either by the group as a whole or by publicly recognized leaders. These ceremonials are social also in a deeper sense than being the possession of all the existing members of the tribe. They have an immemorial history and are felt to be shared by the ancestors as well as by the living. They are therefore in the highest degree inviolable. The welfare and efficiency of the tribe are bound up with the scrupulous and reverent observance of the ancient rites. The individual who participates in them does not dare to speak of them or to employ their myths and prayers except in the manner and on the occasions which the group customs allow. The things with which the religious ceremonials deal are, as we have seen, the things of common concern, such as the food supply, the regulation of marriage and the care of children, the conduct of war, protection against disease, and unusual natural events like floods and drought. An interesting evidence of the social character of religion is seen in the fact that the recognized deities are those spirits which are identified

with an organized human group. William Robertson Smith points out that "the difference between gods and demons among primitive Semitic peoples lies not in their nature and power,. . . .but in their relations to man. The jinn would make very passable gods, if they only had a circle of human dependents and worshipers; and conversely a god who loses his worshipers falls back into the ranks of the demons, as a being of vague and indeterminate powers, who having no fixed personal relations to men, is on the whole to be regarded as an enemy" (p. 121). The same relation is seen in other stages of development. For example, the great gods embody the qualities of character which have been most completely established in the common social experience. The lesser gods represent local or intermittent, partially organized interests of the common mind.

On the inner psychological side this social character of the religious consciousness is identical with the neighborly sympathetic attitude. It springs up quite naturally in any group which has common experiences and whose members are mutually dependent. It has its most original and primary development in the family. Now the inmost bond of the family life is that which exists between the mother and the child. It is this which has given stability and consistency to the family and resulted in the permanence of the relation between the parents. Instead of the care of the child resulting from the permanence of relations between parents, it is probable that the parents were held together by the care of the child. It was originally the conditions under which woman was compelled to live while caring for the child which made her peculiarly the center of the social attitude and enabled her to foster and radiate the social atmosphere. On this account early society grew up around the mother and the child. This is shown in the fact that descent is first reckoned in the

female line. The children belong to the mother's family and not to the father's. The husband gave up his own people and went to live with the family of the bride. More than this, woman became through her settled life the creator and owner of property. In this way she exerted control over the social situation, and the feminine quality of sympathy and love became the chief element of the constructive social consciousness.

This social consciousness is, after all, the organizing, controlling power in human life. It maintains its continuity through successive generations. It molds all docile individuals to its will, and crushes or excludes those who will not conform. The newborn child is submitted to its authority and is closely held within its prescribed customs through life. It has the force of external law and of final authority. This will of the group is objectified in agents regarded as over and above the group itself. They embody the sacredness, permanence and legislative sanctions of the abiding social consciousness. This common consciousness, expressed in vivid sensuous symbols, it may be, of totem animals, or of great personalities, and in dramatic ceremonials, is constantly renewed and strengthened in the most vital experiences of the group. All of the interests and values of life are felt to center in the tribal symbols, the ceremonial observances. All the arts of speech, music, personal decoration, and the dance are contributing elements in the ceremonial. There is no art or knowledge, law or labor, known to the age which is not comprehended in the religious observances. In primitive peoples none of these interests exists independently. Life is of one piece and it is religious. It seeks for the great means of life and does so through the one organized will of the group. This social consciousness extends over the most private and seemingly individualistic activities. For example, among the natives of southeast Australia Howitt found that hun-

ters who kill game at a distance from the camp observe the strictest rules with reference to the distribution of the parts of the animal. Different regulations exist for different game, but all of them are minute and specific like the following rules for distributing the native bear: "Self, left ribs; father, right hind leg; mother, left hind leg; elder brother, right forearm; younger brother, left forearm. The elder sister gets the backbone, and the younger, the liver. The right ribs are given to the father's brother; a piece of the flank to the hunter's mother's brother; and the head goes to the young men's camp."

The religions of civilized peoples like those of primitive peoples have preserved the same general biological and social character. Their energizing impulses are those of the natural instinctive tendencies to maintain life, but with greater elaboration and idealization. In the teaching of Jesus it is assumed that the faithful will have their necessities providentially provided. Food and raiment are among the things conceived as fundamental in the demands of religion, and one must have faith in securing them, without worry or anxious care. The petition for the coming of the kingdom in the great prayer of Christendom is followed by the prayer for daily bread. Religion never gets away from this primal necessity, though it does take it up into an idealized and extended usage. It seeks the bread of life in the fullest sense. Food and drink are the materials of the communion service. This pervasive imagery drawn from the most elemental experiences of the natural man is unmistakable. The water of life, the fountain of life, the river of life, the tree of life are yet the most suggestive terms concerning even the highest needs of our human nature. What will a man give in exchange for his life? is the challenging cry. It is notable that the modern as well as the ancient religious consciousness is brought to sharp definition in great crises of famine, flood, pesti-

lence, and war in which the very existence of the people is endangered.

But it may not be so easily admitted that the reproductive instinct is vital in the religious consciousness. Here, however, there is much evidence of the objective kind embodied in our customs. Our religious practices, like those of earlier stages, are particularly in evidence at marriage, at childbirth, and at the time of puberty when the youth are confirmed or otherwise initiated into the group. The profound interest which the Christian community takes in children is an expression, however unconsciously it may be so, of the reproductive instinct.

The direct evidence, however, for considering the sex instinct basal in religion is the fact that the religious consciousness is attained naturally and simultaneously with the maturing of that instinct, and that certain of its manifestations appear directly and in a decisive manner at the heart of religious experience and religious customs.

That adolescence is the period in which religion becomes vital to the individual, all students of the subject agree. The results of the detailed investigations of thousands of cases by Starbuck, Coe and Hall confirm this. The universal practice of the liturgical churches in receiving youth as full members at this period is impressive evidence that this is the natural and normal time of religious awakening. The practice of the natural races in initiating their children at this epoch adds world-wide and world-old usage in support of the close relation of this instinct to the social attitude so characteristic of all religion.

Not only is adolescence the time when the reproductive instinct and religion develop in the individual, but there is evidence that religion arises in and through the maturing of the instinct taken in its full significance. Up to this time the individual is self-centered, and possesses little spontaneous or deep interest in other persons. His attitude

toward organized institutions and groups of people, even his own family, is characteristically external, formal, and fragmentary. But now he takes an interest in others, becomes affectionate, sensitive and sympathetic. The urgency, range, and reconstructive power of these attitudes cannot be accounted for by any instruction the youth receives. They are in fact quite independent of instruction and occur without it. The only explanation of the strength of these new interests is that they have an instinctive basis much deeper than the conscious will or intent of the individual. The transformation of adolescence is from an individualistic to a social life and the new psychological quality displayed is that of sensitiveness to the opinion of others—a sensitiveness which is most direct and characteristic with reference to the opinion of the opposite sex.

G. Stanley Hall has recounted in detail the development of adolescent self-consciousness in reference to the opinion of others. "The boy suddenly realizes that his shoes are not blacked, or his coat is worn and dirty, his hair unbrushed, his collar, necktie, or cap not of the latest pattern, while girls love to flaunt new fashions and color combinations and have a new sense for the toilet." Manners also afford opportunity for expression of the new self-consciousness and means of bidding for good opinion. There is pleasure in playing rôles, assuming poses, cultivating moods, modifying one's speech, in pronunciation, choice of words, and often in imitation of the vocabulary of favorite companions or teachers. Athletic feats, pride in physical development, trials of strength and absorbing interest in their 'records' characterize boys in this epoch. The emotions of anger, fear, and pity are intensified and relate to a much wider range of experiences, particularly to those of personal relations.

The youth in his teens is sensitive to the approval and disapproval of his companions to a degree which exceeds

any sensitivity due to reflection or to custom. Nothing but the operation of powerful instincts is sufficient to explain it, and that which distinguishes this period of youth preeminently is the appearance of the sex-instinct. With the ripening of this instinct, sensitivity to the opinion of others reaches its height. The normal individual is profoundly moved by his regard for the opinion of his set, that is, by the public opinion of his group. The seemingly heartless egoistic impulses of earlier years are restrained and tempered by eagerness to win favor and respect and by concern for the comfort and welfare of another. It is in the warmth and passion of this maturing instinct that the disposition of affection, social cooperation and genuine altruism develop. As at no previous time the individual feels an imperative, consuming passion to devote himself to another to the limit of his powers. No labor, danger, or sacrifice is too great to win the one he loves. This phenomenon affords endless material for poetry, fiction, and art. On the side of the difficulties encountered, jealousies engendered, and disappointments suffered, it is the theme of the drama and tragedy. In the common experience of average individuals, no other interest surpasses that which lovers feel in each other; and all people instinctively share this feeling with an intensity which permits no doubt that here is reenacted the most important event in the history of the individual and the race. It is through this affection and respect for the opposite sex that the whole complex system of social ends and institutions establishes its strongest hold upon the individual. Through it the individual is socialized and becomes identified with the welfare of others by his own inmost desire. In this way the home is established. To maintain the home, the shop and various industries exist. Schools are organized for the training of the children, and the state springs up in the coordination and control of all these interdependent interests. One is

thus placed in the midst of the vast social order of the material and ideal activities of mankind. His life is thereby disciplined, moralized and spiritualized.

It is this regard for the opinion of others which makes one amenable to the customs of society and brings one into relation and cooperation with the conventions, fashions, duties and ideals of society. Without this susceptibility to the opinions and example of others a person is lacking in the essential quality of sociability. He is unresponsive to class restraints and stimuli, and shares to a degree the irresponsible and antisocial attitude of the criminal. The sexual instinct, normally operative, radiates this sympathetic, unifying disposition and produces groups characterized by intimate association and mutual support. It is the foundation of the notable gregariousness of mankind. As it gives rise to larger groups, it becomes idealized in the relations of blood brotherhood among savages and in the societies of fellowship and practical endeavor among civilized peoples.

The influence of the sexual instinct in developed social groups is further seen in the fact that these groups continue to employ the technique of the sexual life. They appeal to the individual much after the method of courtship, and he is moved to respond by similar reactions. When the nation seeks volunteer recruits for its army and navy, it displays before the youth attractive pictures of military life, of uniforms, brilliant regiments, exploits of adventure and travel. Even the suggestion of danger on the battlefield is a claim upon the valor and gallantry which the republic, symbolized by a female figure, demands of her lovers among brave youth. The same technique of display, invitation, coyness, and modesty appears upon a vast scale when one nation visits another with a fleet of ships or entertains her visitors at a magnificent "world's exposi-

tion." The etiquette of nations is built upon the manners of my lady's drawing room.

The type of social adjustment characteristic of the sexes is still more obvious in religious groups and in the means used by such groups to win the devotion of individuals. Among the members of a religious body there exist ties of spiritual kinship supported by the strongest sentiments. Conspicuous in the phraseology of Christian Churches is that of the family. The Church is the bride of Christ. The members are children of God; brothers and sisters to each other. They are born into this spiritual family, having been conceived by the Holy Spirit. Love is the pervading bond in all these relations. The virtues of Christian character are those which spring from love: sympathy, patience, forgiveness, fidelity, self-sacrifice, charity. The emotional attitudes aroused by the services of the churches are the tender, melting moods in which the will acquiesces in the appeal for love and comradeship.

The derived character of the technique by which religion makes its appeal to the individual is in keeping with the organizing principle of religious groups. Professor Thomas has aptly described this process. "The appeal made during a religious revival to an unconverted person has psychologically some resemblance to the attempt of the male to overcome the hesitancy of the female. In each case the will has to be set aside and strong suggestive means used; and in both cases the appeal is not of the conflict type, but of an intimate, sympathetic and pleading kind. In the effort to make a moral adjustment it consequently turns out that a technique is used which was derived originally from sexual life, and the use, so to speak, of the sexual machinery for a moral adjustment involves, in some cases, the carrying over into the general process of some sexual manifestations. The emotional form used and the emo-

tional states aroused are not entirely stripped of their sexual content."[5]

This controlling, organizing instinct which emerges with full power in adolescence is accompanied by an awakening of mental life on every side. The senses become more acute; the imagination is developed in new directions, with a scope and energy which often overwhelm the youth in a confusion of aspirations and longings; the will, in the form of urgent ambitions, is roused to resolve upon great enterprises such as patriotic service and social reforms; the intellect is stimulated to great activity, to criticism, analysis, careful reasoning and often to constructive production. It is the period of idealism, the age in which the ends set up for attainment are remote and vast. These ends are also ideal in the sense of being altruistic and disinterested. The same disregard of mere personal comfort or success which leads the youth to give himself with such abandon to win a lady's hand, is shown in devotion to other interests in which his will is once enlisted. The statisics concerning the aspirations of youth show that the tendency to go outside personal knowledge and choose historical and public characters as ideals was greatly augmented at puberty, when also the heroes of philanthropy showed marked gain in prominence.[6] Earl Barnes remarks significantly, "No one can consider the regularity with which local ideals die out and are replaced by world ideals without feeling that he is in the presence of law-abiding forces." Dr. Thurber's replies from thousands of children in New York with reference to what they wanted to do when grown showed that "the desire for character increased throughout, but rapidly after twelve, and the impulse to do good to the world, which had risen slowly from nine, mounted sharply after thirteen." From his survey of many investi-

[5] Thomas: *Sex and Society*, 115 f.

[6] G. S. Hall: *Adolescence*, II, 387. Summarizes studies by Earl Barnes, Thurber, Kline.

gations, G. Stanley Hall concludes that with reference to the choice of ideals during childhood and youth: "Civic virtues certainly rise; material and utilitarian considerations do not seem to rise much, if at all, at adolescence, and in some data decline. Position, fame, honor, and general greatness increase rapidly, but moral qualities rise highest and also fastest just before and near puberty and continue to increase later yet. By these choices both sexes, but girls far most, show increasing admiration of ethical and social qualities."[7]

By reason of instinctive awakening to the larger social interests, and by virtue of greater mental power for forming and following comprehensive ideals, youth is the period for the choice of life-occupations, for the development of patriotism, social reforms and religious enthusiasms. At this age the whole nature is full of energy which creates boundless faith in the possibility of wonderful achievements. Idealism, in the strict sense, that is, vital interest in distant and difficult, even utopian humanitarian enterprises, is natural to this age. There is great enthusiasm for heroes, patriots, and religious leaders. It is the time when youths enlist in the army, when they devote themselves to social service, to foreign missions and to philanthropy and charity.

A general summary of this discussion may be briefly made. There is no single instinct or faculty in human nature to which the religious consciousness can be attributed. It is rather the result of the development and interaction of the primal instincts. Such a development is peculiar to man, although he shares these primal instincts with the lower animals. Man possesses a larger brain and more flexible nervous organism through which he is better able to profit by experience. He has gradually attained through a long and tedious process of trial and error, of

[7] G. Stanley Hall: *Adolescence*, II, 392.

experimentation and reflection, an elaborate equipment of practical wisdom, of tools, inventions and social attitudes in which his native instincts secure an expression and a fulfilment far beyond anything possible for the lower animals. He has substituted for the irregular, uncertain means of securing food in savage life, the settled, dependable processes of agriculture and modern industrialism and business enterprise. He has also discovered the value of cooperative, sympathetic attitudes as contrasted with the clannish, exclusive spirit of earlier stages. Thus the tender, intimate, unifying sentiments are being consciously extended to all human beings without distinction of race or class. There is developing a consciousness within whole nations and within mankind as a world-wide family and brotherhood, the inner, controlling motive of which is the elemental craving for life, but for a life richer and fuller and longer, in which all men everywhere may share. It was in the demands of his group life and in the dramatic ceremonial representations of this corporate life that religion controlled, restrained and elevated the life of primitive man. From the working of this common life sprang his notions of divine beings, and through these notions his ancestral customs and ideals of life were mediated to each generation again. The same psychological process operates to-day increasingly clarified, organized and freed from superstition. Compared with those of early man the supreme ideals of our historic and contemporaneous life are vaster, more attractive, more adjustable to the deep needs of our nature. But whatever the degree of refinement, it is just this elaboration and idealization of the primal instinctive interests and the accompanying sense of supreme values which everywhere constitute the life of religion.

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THE FOLLOWERS OF JESUS IN THE TALMUD.

THE FIVE DISCIPLES OF JESUS.

IN the Talmud Sanhedrin 43*a* we read: "Our Rabbis have taught, Jesus had five disciples — Matthai, Nakkai, Netzer, Buni and Thodah. They brought Matthai (before the judges). He said, 'Must Matthai be killed? For it is written (Ps. xlii. 2): *Matthai* (= when) shall (I) come and appear before God.' They said to him, 'Yes, Matthai must be killed, for it is written (Ps. xli. 5): *Matthai* (= when) shall (he) die and his name perish.' They brought Nakkai. He said to them, 'Must Nakkai be killed? For it is written (Exod. xxiii. 7): The *Naki* (= innocent) and the righteous thou shalt not slay.' They said to him, 'Yes, Nakkai must be killed, for it is written (Ps. x. 8): In secret places doth he slay *Naki* (= the innocent).' They brought Netzer. He said, 'Must Netzer be killed? For it is written (Isa. xi. 1): *Netzer* (= a branch) shall spring up from his roots.' They said to him, 'Yes, Netzer must be killed. For it is written (Isa. xiv. 19): Thou art cast forth out of thy grave like an abominable *Netzer* (= branch).' They brought Buni. He said to them, 'Must Buni be killed? For it is written (Ex. iv. 22): *B'ni* (= my son), my first born Israel.' They said to him, 'Yes, Buni must be killed. For it is written (Ex. iv. 23): Behold, I slay *Bincha* (= thy son) thy first born.' They brought Thodah. He said to them, 'Must Thodah be killed? For it is written (Ps. c. 1): A Psalm for *Thodah* (= thanksgiving).' They

said to him, Yes, Thodah must be killed, for it is written (Ps. l. 23): Whoso sacrificeth *Thodah* (= thanksgiving) honoreth me.' "

No Christian tradition exists which specifies any five out of the Twelve as having met with such a fate. But the fact that the five were called disciples of Jesus implies that they were Christians, not that they were contemporaries of Jesus. It is possible that the story refers to the persecution of Christians under Bar Cocheba, and presents a fantastic account of some incident of that persecution. The fact that the martyrdom of these disciples is described on the same page of the Talmud on which the execution of Jesus at Lud (Lydda) is narrated, shows that it was a Jewish and not a heathenish court which sentenced the disciples. On the other hand this Talmudic passage is one of the many curious examples of the way in which the Scriptures are applied by the rabbis. It is one of the strangest specimens of transparent fiction, and of silly trifling with the words of Scripture.

JACOB OF KEPHAR SAMA (SECHANJA).

Besides the five names given above the Talmud also knows of another disciple of Jesus, Jacob of Kephar Sama, who was known for his thaumaturgic power, which no doubt led him to be placed in immediate relation with Jesus, the master of sorcery, and which in his time caused a sensation that was never afterwards to be forgotten. In the Talmud this Jacob comes before us as a performer of miracles and a teacher. For convenience' sake we divide the matter, and treat

1. *Jacob, the Performer of Miracles.*

a. In the Tosephta Hullin II, 22, 23 we read: "The Case of Rabbi El'azar ben Damah, Whom a Serpent Bit.—There came in Jacob, a man of Kephar Sama, to cure him

in the name of Jeshua ben Pandira, but Rabbi Ishmael did not allow it. He said, 'Thou art not permitted, Ben Damah.' He said, 'I will bring thee a proof that he may heal me.' But he had not finished bringing a proof when he died. Rabbi Ishmael said, 'Happy art thou, Ben Damah, for thou hast departed in peace, and hast not broken through the ordinances of the wise; for upon every one who breaks through the fence of the wise, punishment comes at last, as it is written (Eccles. x. 8): Whoso breaketh a fence a serpent shall bite him.' "

b. In Jerusalem Shabbath 14*d* we read the same almost word for word with the addition at the end: "The serpent only bit him in order that a serpent might not bite him in the future. And what could he (Ben Damah) have said? (Lev. xviii. 5): 'Which, if a man do, he shall live in them' (i. e., not die in them)."

c. In Jerusalem Aboda Zara 40*d*, 41*a*, we find the same as in *a* above, except that after the words "came in to cure him," is added, "He said, 'we will speak to thee in the name of Jeshu ben Pandira.' "

d. In the Babylonian Talmud Aboda Zara 27*b* we read thus: "It happened that Ben Dama, son of Rabbi Ishmael's sister, was bitten by a serpent. There came Jacob of Kephar S'khanja to heal him, but Rabbi Ishmael would not allow him. Ben Dama said, 'Rabbi Ishmael, my brother, allow me to be healed by him, and I will bring thee a verse from the Torah that this is permitted.' But he had not finished his discourse when his soul departed, and he died. Then Rabbi Ishmael exclaimed over him: 'Happy art thou, Ben Dama, for thy body is pure and thy soul hath passed away in purity and thou hast not transgressed the words of thy companions, who have said (Eccles. x. 8): Whoso breaketh through a fence, a serpent shall bite him.' "

As to the details of the story, there is little variation among the several versions given above. In all, the Chris-

tian proposes to heal the sick man in the name of Jesus ben Pandira, but Ishmael would rather have his nephew die than have him cured through the name of Jesus.

Leaving out of sight the fanaticism of this rabbi, we can only say that our narrative confirms the New Testament which records the miracles of Jesus and his disciples.

2. *Jacob the Teacher.*

1. In Tosephta Hullin II, 24, we read: "The case of Rabbi Eliezer, who was arrested for *Minuth*,[1] and they brought him to the tribunal for judgment. The governor said to him, 'Doth an old man like thee occupy himself with such things?' He said to him, 'Faithful is the judge concerning me.' The governor supposed that he only said this of him, but he was not thinking of any but his Father who is in heaven. The governor said to him, 'Since I am trusted concerning thyself, I will also be in this. I said, Perhaps these societies err concerning these things. *Dismissus,* Behold thou art released.' And when he had been released from the tribunal, he was troubled because he had been arrested for *Minuth*. His disciples came in to console him, but he would not be comforted. Rabbi Akiba came in and said to him, 'Rabbi, shall I say to thee why thou art perhaps grieving?' He said to him, 'Say on.' He said to him, 'Perhaps one of the *Minim* (i. e., Jewish Christians) has said to thee a word of *Minuth* and it has pleased thee.' He said, 'By Heaven, thou hast reminded me! Once I was walking along the street of Sepphoris, and I met Jacob of Kephar Sichnin, and he said to me a word of *Minuth* in the name of Jeshu ben Pantiri, and it pleased me. And I was arrested for words of *Minuth* because I transgressed the words of Torah (Prov. v. 8): Keep thy way far from her, and come not nigh the door of her house (vii. 26), for she hath cast down many wounded.'"

[1] I. e., a leaning towards Christianity.

2. In the Talmud Aboda Zara 16*b*, 17*a*, we read the following: "Rabbi Eliezer was seized on the charge of being a Christian. The judge said to him, 'Thou, an aged man, to busy thyself with such idle matters!' He replied, 'I admit the faithful reproof of the judge.' The latter, thinking that he referred to him, whereas he really meant God, said: 'Since you trust me you are discharged.' He went home deeply distressed, and would receive no consolation from his disciples. 'Rabbi!' cried Aquiba, 'Allow me to say something which I have learned from thee.' 'Say it,' was the reply. Hast thou not had a dispute with a Christian, and by approving what he said, got thyself into trouble?' 'Aquiba!' said he, 'thou just remindest me of a certain incident. Once upon a time I was walking in the upper street of Sepphoris, when I met one [of the disciples of Jesus of Nazareth], whose name was Jacob, a man of Kefr Sekanja, who said to me: "It is written in your law: Thou shalt not bring the hire of a whore into the house of the Lord thy God (Deut. xxiii. 18). May a sink be made with it for the high priest?" This question I could not answer. Whereupon he said to me: 'Jesus of Nazareth taught me thus on the subject. It is written, He gathered it of the hire of an harlot (Micah i. 7); that is, it came from an impure source, and it may be applied to an impure use." When I heard this explanation I was pleased with it, and on this account I was accused of heresy, because I trespassed against the word: Remove thy way far from her (Prov. v. 8; "from her," i. e., from heresy).'"

3. The same story is also found in the Midrash on Eccles. i. 8, where the reading is: "Thus has Jesus son of Pandera taught," whereas the Talmud reads: "Jesus the Nazarene."

The Eliezer here mentioned is Rabbi Eliezer ben Hyrcanos,[2] brother-in-law of Gamaliel II, the grandson of Ga-

[2] See the interesting treatise of Toettermann, *Rabbi Eliezer ben Hyrcanos*

maliel I, the teacher of Paul. That Eliezer was a famous teacher can be learned from the fact that he is mentioned 324 times in the Mishna. Now this famous teacher acknowledges that he was pleased with an explanation given by Jesus of Nazareth. This teaching Eliezer received from a certain Jacob, one of the disciples of Jesus, and whom the Jewish historian Graetz identifies with the apostle James.[3]

The genuineness of this incident is defended by the late Jewish scholar Derenbourg in *Essai sur l'histoire et la geographie de la Palestine*, pp. 357-360, although Edersheim in *Life and Times of Jesus the Messiah* I, 537, declares it to be plainly apocryphal. But there is no ground to reject the evidence of a man so well known as Rabbi Eliezer, especially as it tells against himself. The story seems to be well authenticated.

ANOTHER CHRISTIAN WHO PERFORMS MIRACLES.

In Jerusalem Shabbath 14*d* we read: "The grandson [of Rabbi Joshua ben Levi] had something stuck in his throat. There came a man and whispered to him in the name of Jeshu Pandera, and he recovered. When he (the Christian) went out, Joshua said to him, 'What didst thou whisper to him?' He said to him, 'A certain word.' He said, 'It had been better for him that he had died rather than this had happened.' And it thus befell him, 'as it were an error that proceedeth from the ruler' (Eccles. x. 5)."

The meaning of the quotation from Eccles. x. 5 seems to be that the fact of the child having been cured by a Christian was a deplorable evil which could not be undone, as the command of a ruler given in error, and implicitly obeyed, may result in mischief which cannot be afterwards

sive de vi qua doctrina Christiana primis seculis illustrissimos quosdam Judaeorum attraxit, Leipsic, 1877.

[3] *Gnosticismus und Judenthum*, p. 25, note 22.

put right. The saying is characteristic of the feeling of Jews towards Christians in the third century in Palestine.

A CHRISTIAN JUDGE APPLIED TO.

In the treatise Shabbath 116*a*, *b*, we read: "Imma Shalom was the wife of Rabbi Eliezer, and sister of Rabban Gamaliel. There was in her neighborhood a philosopher of whom report said that he would not take a bribe. They wished to have a laugh at him. So she brought him a golden lamp, and they went before him. She said: 'I wish them to apportion unto me of the property of the family.' He said to them, 'Divide it.' He (Gamaliel) said: 'We have it written: Where there is a son, a daughter does not inherit.' He (the judge) answered, 'From the day that ye were exiled from your land, the law of Moses has been taken away, and the law of the Evangelion has been given, and in it is written, "A son and a daughter shall inherit alike." ' Next day, he (Gamaliel) brought him a Libyan ass. He (the judge) said to them, 'I have looked further to the end of the book, and in it is written: "I, the Gospel, am not come to take away from the law of Moses but to add to the law of Moses," and in it (the law of Moses) is written, "Where there is a son, a daughter does not inherit." ' She said to him, 'Let your light shine as a lamp!' Rabban Gamaliel said to her, 'The ass has come and trodden out the lamp.' "

Whether the story is intended to represent more than to show the venality of this judge, is difficult to say. It is also questionable whether the philosopher possessed a text of the Gospel at all. It is more likely that he quoted what seems to be a "saying of Jesus" from a defective memory, and in this perverted form the sentence passed into the Talmud.

With this last story we have exhausted all the Talmud passages collected by Dalman. But we cannot stop here,

because we believe that still more can be derived from an examination of the Talmud. We mean especially the numerous sentences which in the Talmud are placed specifically in the mouth of Jewish authorities, but which might with greater correctness be ascribed to Jesus. Of this we shall speak further on. For the present we continue our notices on the followers of Jesus.

CHRISTIANS STUDY THE SCRIPTURES.

In the Talmud Aboda Zarah *4a* we read the following: "Rabbi Abahu recommended Rabbi Saphra to the Christians as a good scholar. Thereupon the Christians remitted his taxes for thirteen years. But it happened that one day Rabbi Saphra was asked to give an explanation of Amos iii. 3, 'You only have I known of all the families of the earth; therefore I will punish you for all your iniquities,' adding, 'How can you suppose God to vent his wrath on one whom he addresses as his friend?' Rabbi Saphra was unable to reply. The Christians then took him, tied a rope round his head, and tormented him. When Rabbi Abahu came and found him in this plight, he demanded of the Christians: 'Why do you torment this rabbi so cruelly?' They replied, 'Did you not tell us that he was a very learned man? To the first question we asked of him he was unable to make any answer.' 'I did, indeed,' answered Rabbi Abahu, 'say that he was a good scholar in the Talmud, but not in the Scriptures.' 'But how is it that you understand the Scriptures and he does not?' To this Rabbi Abahu answered: 'We, who come in contact with you Christians are obliged, for our self-preservation, to study the Scriptures; because you dispute so often with us from the Scriptures, and because we know that you study them; but the other Jews, who live among Gentiles, have no need of that, as they do not dispute with them concerning the Scriptures.'"

What a gloomy picture! The Jews read the Scriptures, not because they were concerned about the "one thing needful," but only for the sake of controversy!

Another illustration of the acquaintance of the Christians with the Scriptures is contained in Talmud Yoma 40*b*: "The disciples asked Rabbi Akiba, whether, in case that the lot appointed the goat which stood on the left of the priest for a sacrifice in the Temple, the position of the goats should be changed? He replied, 'Give the Christians (*minim*) no occasion for assailing us'; or as Rashi, the commentator, explains it: 'To the disciples of Jesus of Nazareth who discourse concerning the Scriptures, that they do not say you (Jews) act arbitrarily.' "[4]

ENACTMENTS AGAINST THE WRITINGS OF THE CHRISTIANS.

That the Gospels and other writings of the *Minim* (i. e., Christians) were in circulation at an early time, we see from the many enactments of the Jewish rabbis against them. At the time that the rules for keeping the Sabbath were under consideration, it was asked in the schools whether, if the Gospels and other books of the Christians should happen to fall into the fire, it would be permissible to rescue them from the fire, inasmuch as the name of God was written in them, and they contained numerous quotations from the Old Testament. On this matter we read Tosephta Shabbath, XIII, 5: "The Gospels and the other books of the Christians they do not save, but these are burnt in their place, they and their sacred names. Rabbi José the Galilean says, 'On a week-day one cuts out the sacred names and hides them and burns the rest.' Rabbi Tarphon said, 'May I lose my son! if they come into my hand I would burn them and the sacred names too. If the pursuer were pursuing after me, I would enter into a house

[4] So in the Venice edition, quoted by Goldfahn, in Graetz's *Monatsschrift*, 1873, p. 109.

of idolatry, but would enter not their houses. For the idolaters do not acknowledge Him (i. e., God) and speak falsely concerning Him. And concerning them the Scripture says (Is. lvii. 8): And behind the doors and the doorpost thou hast set thy memorial.' Rabbi Ishmael said, 'Whereas in order to make peace between a man and his wife, God says (cf. Num. v. 23): Let my name which is written in holiness be blotted out in water, how much more should the books of the Minim, which put enmity and jealousy and strife between Israel and their Father who is in Heaven, be blotted out, and their sacred names too. And concerning them the Scripture says (Ps. cxxxix. 21), Do I not hate them, O Lord, which hate thee, and I loathe them that rise up against thee. I hate them with a perfect hatred, and they have become to me as enemies. And even as men do not save them (the books) from burning, so do they not save them from falling (from a building), nor from water, nor from anything which destroys them.' "

Almost the same thing we read in Jerusalem Shabbath 15*c* and Babylonian Shabbath 116*a*. There we see that not even the strict observance of the Sabbath was to stand in the way of the instant destruction of the books of the Minim; nay, the terrible profanity of destroying the names of God which were thought to give the material on which they were inscribed a special and inviolable sanctity, was set aside, and this not only on the Sabbath, when the cutting out of them might be held to entail "work," but according to Rabbi Tarphon, even on week days.

That, according to Rabbi Akiba, those have no portion in the world to come who read in books outside the canon (i. e., books of the Minim) we have already noticed above. Nevertheless the Gospels circulated, at least the Gospel of Matthew. For whatever may be the date assigned to it by modern critics, certain it is that in some form it circulated at a very early date. In the Talmud Sanhedrin 90*b*

we read that Gamaliel II (who died about the year 110 A. D.) was asked: "How do you know that the dead will rise again?" He adduced passages in proof of the resurrection from the law (Deut. xxxi. 16), the Prophets (Is. xxvi: 19) and the Hagiographa (Song of Songs ix). These passages were rejected as insufficient. He finally quoted the words "the land which the Lord sware unto your fathers to give them" (Deut. xi. 21). Since the fathers were dead, the passage must have promised a resurrection, when alone the land could be given to these fathers. This shows the force of the interpretation given by Jesus in Matt. xxii. 32 ("I am the God of Abraham, and the God of Isaac, and the God of Jacob! God is not the God of the dead, but of the living"), and the inference he deduced therefrom.

ENACTMENTS AGAINST THE FOLLOWERS OF JESUS.

On several occasions we have referred already to the intercourse between the rabbis and Jewish Christians,[5] which shows that Minuth (i. e., Christianity) had an attractive power. In order to break its influence and to check its growth, shortly before the destruction of Jerusalem the first formal anathema was hurled by the entire Rabbinic assembly, which had met at Jamnia or Jabneh,

[5] As another illustration we quote the following from *Midrash Koheleth* on Ecclesiastes, i. 8: "Rabbi Hanina, nephew of Rabbi Joshua, went to Capernaum, and the Christians bewitched him and made him ride into the town on an ass upon the Sabbath. When he returned to his uncle, Rabbi Joshua gave him an unguent which healed him from the bewitchment. But Joshua said to him: 'Since you have heard the braying of the ass of that wicked one, you can no longer remain on the soil of Israel.' Hanina went down to Babylon and there died in peace.—Farrar, who quotes this story in *Expositor*, Vol. VI, 1877, p. 423, says: "The expression 'the ass of the wicked one' is only too plainly and sadly an illusion to the ass ridden by our Lord in his triumphal entry into Jerusalem; and the suppression of the name Jesus is in accordance with the practice of only mentioning Him in an oblique and cryptographic manner.—Lowe (*Fragment of the Talmud Babli*, Cambridge, 1879, p. 71) translated for "ass" *wine*—in the Talmud both words are expressed the same—and thinks that the Christians intoxicated him with the wine of the *agapai*, which they seem to have celebrated on Friday night. More probable, perhaps, is the meaning of Delitzsch (*Ein Tag in Capernaum*, Leipsic, 1873, p. 25) who says that the "ass of that wicked" refers to the foolish preaching of the crucified

under the auspices of Gamaliel II. Thus the great Rabbi Moses Maimonides[6] (died 1204 A. D.) says: "In the days of Rabbi Gamaliel the *minim* increased in Israel, and afflicted Israel, and seduced men to turn away from God. Then when he saw that it was indispensably necessary, he instituted that imprecation in which God is besought that the minim should be destroyed, and added it to the eighteen prayers, so that the whole number now found in the Prayer Book is nineteen." Thus far Maimonides in Hilcoth Tephilla, chap. II.

From the Talmud we learn the history of the prayer which is as follows: "Simon Pakuli arranged the eighteen benedictions before Rabbi Gamaliel in the present order at Jabneh. Said Rabban Gamaliel to the sages: 'Is there none who knows how to prepare a benediction against the minim?' Then arose Samuel the Little and prepared it (Talmud Berachoth 28*b*)." This prayer, which now forms the twelfth of the so-called Eighteen Benedictions or Shemoneh Esreh[7] reads now: "O let the slanderers have no hope; all the wicked be annihilated speedily and all the tyrants be cut off quickly; humble thou them quickly in our days. Blessed art thou, O Lord! who destroyest enemies and humblest tyrants."

That this was not the original form is clear from the different recensions of this prayer which exist. Thus Reichardt copied from an old manuscript the following form: "Be thou not a hope to the *meshumadim* (i. e., apostates), but may the *minim*, the double-tongued, the infidels, the traitors, perish together in a moment; may the enemies of thy people Israel be speedily annihilated; mayest thou speedily destroy the kingdom of pride and rend it in pieces; mayest thou humble them speedily in these our days.

[6] The Jews call him the "second Moses," whereas Moses Mendelssohn is styled the "third Moses."

[7] See my article "Shemoneh Esreh" in McClintock and Strong's *Cyclop.*

Blessed art thou, O God, for thou shalt break into fragments the wicked, and humble the proud."[8] Another form is given by Dalman, "Let there be no hope for the apostates, and the kingdom of pride mayest thou destroy quickly in our days. And let the *Nazarenes* and the Christians suddenly perish. Let them be extinguished from the book of life and not be written with the righteous. Blessed art thou, O Jahve, who humblest the wicked."[9]

Whatever the form of the so-called *Birkath ha-minim*—as the prayer is called—may have been, its existence is attested by Epiphanius, who says that the Jews curse and excommunicate the Nazarenes three times during the day.[10] The same we also learn from Jerome[11] and Justin Martyr.[12] In spite of all stringent measures the numbers of believers increased. As many cherished the Christian faith in secret, it was enacted that in case a reader erred in one of the benedictions, he was not to be removed from the reading-desk, but in case he erred in the benediction against the *minim* he was to be removed, because he was then suspected of being a *min* himself.[13]

ENACTMENTS AFFECTING CUSTOMS AND USAGES.

The influence of Christianity being felt more and more, the rabbis changed some of their ancient customs. Thus

[8] *The Relation of the Jewish Christians to the Jews in the First and Second Centuries.* London, 1884, p. 46.

[9] *Die Worte Jesu*, p. 299 et seq. See also *Jewish Quarterly Review*, X (1898), 654 et seq.; Bousset, *Die Religion des Judentums im neutestamentlichen Zeitalter*, 1903, p. 155 et seq.; Fiebig, *Der Mischnatractat Berachoth* (1906), p. 28.

[10] *Adversus Haeres.*, XXIX, 9 (ed. Petav., p. 124).

[11] *Ad Jesajam* V, 18-19; XLIX, 7; LII, 4 et seq. (ed. Vallarsi IV, 81, 565, 604).

[12] *Dialogus cum Tryphone*, chap. 16.

[13] Strange to say the Talmud Berachoth 29*a* records that one year after the composition of this prayer against the *minim*, its very author while before the reading-desk could not remember it and spent from three to four hours in trying to recall it to his mind without avail. He was, however, not removed. Had the author changed his mind with regard to those for whom his prayer was intended? or did he himself belong to the church? or was he already a member of the church when he composed this prayer extempore and composed it only in order to avert suspicion of being a *min* himself?

in his commentary on that passage remarks that the Christians used to pay attention to such things.

Because the Christians used to pray towards the east, doubts were expressed as to the feasibility of having the face turned eastward during prayer, and in order to protest most emphatically against the increasing heresy (i. e., Christianity), it was recommended to turn the face westward during prayer, and the Talmud Baba Bathra 25*a* states of Rav Shesheth, who was totally blind, that he ordered his servant to place him in any other but the eastward direction when he wished to pray, because the Minim turned in that direction. The commentator on this passage, Rashi, refers it to "the disciples of Jesus."

From all this it is evident that the growth of the Christian Church must have been very rapid, otherwise the synagogue would not have required these measures, intended to check the advancement of the Gospel.

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CRITICISMS AND DISCUSSIONS.

DEATH AND RESURRECTION.

"What matters it if searching mind sublime
Would doom the lights of Heaven to die;
If hosts of stars were swept from sky
As golden harvests by the scythe of time?
Thy righteous thoughts and what thy love conceived,
Thy beauteous dreams are not by time impaired;
They grow a harvest from that scythe-man spared
And treasures in celestial stores received.
Go forth, Humanity, on journey blessed,
Rejoice, eternal life dwells in thy breast."

V. Rydberg.

(From the Swedish by J. E. Fries.)

Death and Resurrection is the title of a remarkable book just published by The Open Court Publishing Company. Its author, Gustaf Björklund, who died in the year 1903, was a philosopher with a marked influence on modern thought in his native country, Sweden. As an ardent worker in the international peace movement he is known also far outside that country. He never occupied a professor's chair nor any official position whatsoever, but devoted his entire time to quiet studies and the compilation of a series of thoughtful volumes. Young, liberal Sweden has drawn heavily upon the funds of undogmatic wisdom that this unassuming thinker accumulated in his several books. It is our confident hope that this, his last work, will prove equally valuable to an interested public on this continent.

The most noteworthy characteristic of Björklund's method of treating his subject is the great thoroughness with which he investigates the arguments of his opponents. After reading the present volume we cannot for a moment doubt the statement in the author's preface that his studying of the physical and chemical foundations of modern materialism alone required his exclusive attention

for several years. It may be well to remember this at a first reading of the book—if read once, it will surely be read over again—because the critical student will meet many statements which he by no means is ready to accept without previous proofs. We must not suspect the clear, logical intellect of Björklund to have overlooked this, and if we only keep our point in mind we shall invariably find sooner or later the desired demonstration. The reason for this strange arrangement is to be found in the dramatic construction of the book. Björklund gradually works up to a climax and is not inclined to give away his thunder too early.

In giving a résumé of *Death and Resurrection* it may be advisible, therefore, to turn the barrel upside down, so to speak, first pointing out the aim of Björklund and subsequently endeavoring to follow the line of argument by which the author proves his thesis.

Björklund is an idealist, yea, a spiritualist. And yet he gives such convincing proofs of the impossibility of any thing that may be classified under the heading "spirit-communications," that Sir Oliver Lodge and Prof. J. H. Hyslop must turn from him in scorn. On the other hand he differentiates between the material and spiritual world so distinctly that any one who. like Dr. Paul Carus, makes the, in the writer's opinion, futile attempt to reconcile the two, finds in him an equally decided opponent. The publishing of the present volume, therefore, reflects great credit on the part of Dr. Carus and is a new monument among many to his openmindedness and unflinching desire to bring every possible argument against his philosophy under discussion.

A large part of *Death and Resurrection* is naturally devoted to the demonstration of the contrast between life or life-force on one hand, and physical energy in all its forms on the other. Here Björklund and Dr. Carus differ radically. True, even the latter is obliged to concede that life-force is a very unique form of energy. In his article "Life and the Soul" (*Monist*, April, 1908) he says, that the process of life is a phenomenon *sui generis*, more complicated than any purely physical or chemical process; "Vitality or the function of life is a kind of energy of its own. In this sense we may retain the old idea of vitalism in a modernized form and classify life by itself"; and again: "We would say then that the function of life is a manifestation of energy which forms a category of its own. It is as different from physical processes as chemical combinations are different from purely mechanical movements—or even more so." But to take the full step and acknowledge that life has no roots what-

ever in the material world he will not, he cannot, because a spiritual world does not fit into his philosophical system. It is necessary to the theory of Dr. Carus and to that of pure materialists alike, that the formation of a Homunculus be possible in theory if not in practice.

With no other resources than the material world to fall back upon, how then did life grow out of matter and physical energy? We face again the time-worn question of *generatio aequivoca*. If spontaneous generation could be proved without the shadow of a doubt to be impossible, then, surely, we must look beyond the boundaries of the visible world for the origin and substance of life. *This is what Björklund does in the volume under consideration.*

But first let us see what the materialist, and Dr. Carus with him, has to say on this subject. In this respect the two reason exactly alike. In the article referred to above, Dr. Carus says: "Living bodies consist of the very same materials of which the rest of the world is composed. Chemistry has resolved matter into some seventy elements, and the elements of organic chemistry are absolutely the same as those of inorganic chemistry. Some of the most unstable and lightest elements play the most important part in the function of life, for we may say that oxygen, hydrogen, nitrogen and carbon are the most essential factors in building up living organisms."...."They [the naturalists] have succeeded in producing organic matter, the first substance thus secured being urea, but they have not succeeded in building up an organism, and there is scarcely any hope for success in producing the smallest living bacterium. This repeated failure has caused mystics to claim emphatically that life is a mystery that never can be solved, but in fact it only proves that the original life-forms are too small to come as yet under our notice. If we only consider that the smallest fungi are about as complicated in comparison to atoms, as the tree is in comparison to a cell, we will understand that we need better microscopes than are now at our disposal before we can discover the most primitive form of life.

"Theoretically considered it should not be impossible to reproduce life. The tendency of certain elements to organize into life-plasm is in itself no more mysterious than chemical affinities or the formation of crystals.

"There is no consistency in the methods of those who see nothing extraordinary in purely physical processes but are overawed when contemplating the basic fact of all biological phenomena, the

formation of living structures. There is no less reason why the simplest life-forms under favorable conditions should not organize certain elements into the structure of life-organisms than for vapor to assume the form of snow crystals in the air at a given temperature, and neither process is theoretically incomprehensible. Both are equally mysterious and equally possible."

Consequently, because every organism consists of nothing but the elements to be found in nature and because each and every one of its functions is performed according to natural laws—therefore nature has of its own accord built the organism. Why have we not discovered nature in the act of doing this? Because our microscopes are not powerful enough. When did, or do, such wonderful combinations of the elements take place? Under favorable conditions. What would constitute favorable conditions? No answer. The spontaneous formation of the snow crystals and of the as yet undiscovered most primitive forms of life is equally mysterious and equally possible. The first part of this last statement is true, the second false, as we presently shall see.

This way of reasoning is so characteristic of the materialist that Björklund has found the same lines of thought almost verbally given in Büchner's book, *Kraft und Materia,* and he has consequently answered Dr. Carus long ago.

We might just as well, says Björklund, make the following statement: No atom in a steam engine differs from similar atoms in surrounding nature; every movement of the engine is performed in the strictest accordance with natural laws; therefore nature has spontaneously built the steam engine without the interference and guidance of a supernatural being, here man. It is of no use to argue, that nature first developed man and through him the engine, because even Dr. Carus admits that the most primitive form of life also is fundamentally constructed as a steam engine, that is, consists of organized matter. "The terms 'living' and 'organized' are synonymous," says Dr. Carus. The only difference is that matter is so much more crudely organized in the engine than in the living units that constitute the organic cell. Little would it profit us in our endeavor to find the truth or non-truth of *generatio spontanea* even if our microscopes were powerful enough to allow us to observe the individual atoms or even the corpuscles of which they are perhaps composed.

To quote Björklund. "Even if we were observing with our own eyes the creation of the first organism we would not be able to

say whether it were the result of natural or supernatural forces. The moment our study commenced the mystic act of creation would already have taken place, an act which lies beyond the boundaries of research, and which we never shall be able to penetrate however minute or comprehensive our observations."

And even if we could scientifically prove that every single being on earth at present has had parents; even if we could trace life back through endless generations to Lord Kelvin's "moss-clad fragment" from another world, or to Professor Arrhenius's spore, brought to our little globe from some distant star in the universe by the radiation pressure of light, we would still be just as much in the dark as to the origin of life. We would have to extend our researches to every planet inhabited by life to ascertain whether the "favorable conditions" existed there, and if not at present, then perhaps some millions of years ago, or would, (why not?) after some millions of years to come, because one single exception to Harvey's law, *omne vivum e vivo*, will suffice to bring the palm of victory into the hands of the materialists.

This whole method is consequently unsatisfactory. To quote Björklund again: "An entirely different method is here necessary; our endeavor must be to find the innermost cause to the whole series of generations evolving throughout the ages. We must in other words derive Harvey's law from the inner nature of matter itself, show that this matter has such qualities that it cannot, never could and never will be able to produce a single living being. Only then shall we have demonstrated that Harvey's formula is a universal, natural law and then it will be not only our right but our duty to draw its logical consequences."

Now then, why is not life force a form of physical energy, including its every known form, gravity, light, heat, chemical affinity, magnetism, electricity or radio-activity? Why cannot living substance or organized matter spontaneously be formed by inert substance, such as we find immediately on earth and by the spectroscope in other parts of the universe? Because physical energy tends to *equilibrium*, life force to *unstable compositions*; because inert substance is a *natural product*, organized matter a *product of art*.

Let us consider a moment the truth, meaning and tremendous weight of this argument.

Take for instance the evolution of our own globe. We have been accustomed to think of the formation of the celestial bodies as

a continuous cooling off from the gaseous state to a stage when life may appear, and further to a condition like that of our moon when they become uninhabitable again. According to this view the whole of the universe is slowly approaching a certain end, Clausius's "thermo-death" when all heat is evenly distributed in the form of motion of the smallest particles of matter. Professor Arrhenius remarks, however, that as we know of no beginning of time, such "thermo-death" would long ago have pervaded the universe. He further demonstrates in his wonderful book *Worlds in Making* how the heat swings as an immense pendulum from the suns to the nebulas and from the nebulas to the suns again. Science at present, therefore, does not contradict philosophy in its demand that time must be unlimited in both directions. To the present status of science and philosophy as regards infinity of space I hope to return some other time in the pages of *The Monist*. Never and nowhere, however, has science found the laws of nature or physical energy to operate differently under equal conditions. The same causes are inevitably followed by the same results. If we therefore prove that physical energy never could or can create life spontaneously on our earth, the homogeneity and continuity of the universe as established by recent science, forces us to conclude that more "favorable conditions" have never and nowhere else existed or shall exist.

But the matter of our earth was once as hot as that of the sun, and was then rich in chemical energy. When sufficiently cooled off to allow chemical affinity to act, compounds as poor in energy as the conditions for the moment permitted, were always formed. The substances of our earth are the ashes resulting from violent chemical reactions. Hydrogen and oxygen "burned" into water. And so nature always tends to satisfy even the feeblest chemical affinity and never rests until it reaches perfect equilibrium. Even the decay that takes place, thanks to the water-circulation due to the sun's radiation, is nothing but a more thorough burning of the substances of our earth; that is, the remnants of the elements that did not find their mates in the primeval world-fire endeavor to satisfy their affinity, wherever a compound poorer in energy may possibly be formed. Thus physical energy is always and without exception falling from a higher to a lower level just as infallibly as the running stream. Indeed, the descending water is only another expression of the same natural law. Finally our earth reaches stagnation, as the moon has done before, and it will thus remain a petrified mummy, until a cosmic catastrophe scatters its substance over immense spaces form-

ing parts of some vast nebula that again will slowly form "new heavens and a new earth" as described so admirably by Professor Arrhenius.

During a certain period of this history of our earth, lo and behold, there appear on its surface certain forces which most decidedly oppose the processes of physical energy. Out of the ashes of the original world-fire burnable matter is again formed. The most neutral compounds are decomposed again and new compositions formed which for a time fight successfully against the leveling tendencies of physical energy but finally succumb to the general, powerful law, decay or oxidize again just as the steam engine, when left to the mercy of nature, is dissolved speedily. It is as if the orderly evolution toward equilibrium suffered a temporary check. We say that "life" takes hold of inorganic matter and forces it to enter into unstable, organic compounds. "Life" utilizes nothing but natural laws in accomplishing its wonders. We are able to calculate the tremendous forces necessary to extract the organic carbon from its compounds and we find at once that such energy sources as are available, i. e., the earth's internal heat and the radiation from the sun are utterly unable without "artful" guidance to accomplish the result.

To quote Björklund: "The spontaneous activity of nature's forces, then, go in a direction just opposite to the one necessary for the production of organic substances. And nothing else was to be expected. The products of combustion resemble fallen weights, slack bow-strings, water below the fall, etc. Whereas combustible organic matter might be compared to lifted weights, set bow-strings, water above the fall, etc. If matter has once fallen from a higher to a lower level of energy it can never spontaneously return, especially as it has just lost the necessary store of energy. As impossible as it is for the swift current to turn its course, or for the fallen weight to lift itself, or for the discharged bowstring to set itself again, so impossible is it for the products of combustion spontaneously to turn into combustible substances.

"From this we now draw the extremely important conclusion that all organic matter is a *product of art,* that is, a product which the forces of nature cannot spontaneously produce."

The quality in matter which causes its inability to "turn the current" is called *inertia.* Inert matter cannot spontaneously deviate from its course; a foreign interference is necessary.

In building a living being, life does exactly, only in a more

perfect way, what man does in building a steam engine. Man reduces the carbon in the ore and so does the cell in the chlorophyl. The chlorophyl granules therefore are strikingly comparable to our blast furnaces. But herewith life's quality of being a product of art is not yet fully emphasized.

Let us quote Björklund again: "No effect, whatever its nature, can exist without cause; and further every effect must have sufficient cause. If therefore we have established that natural forces can no more produce organisms than steam engines, we have also proved that these things would never have come into existence if the inorganic forces had been left to themselves. Neither organisms nor steam engines would exist because they have no cause in the material world. The products of art are not only due to other causes but moreover the relationship between cause and effect is different with them from what it is with the products of nature. Every product of nature has its cause in a previous condition of matter. The cause goes before and the effect comes after in time. The connection between cause and effect is so intimate and complete with regard to the natural products that we may trace the series of occurrences backward and forward in time without other limitations than those imposed by a deficient knowledge of the qualities of matter. Such a connection between cause and effect has been termed *mechanical causality* which reigns without exception in the material world.

"Of entirely different kind and nature is the series of causes pertaining to the production of objects of art. In their capacity of purpose, they are themselves the physical cause of all the work that precedes their birth. When the product of art is finally ready the effect has then gone before the cause. Such a connection is called a *teleological causality* in contradistinction to the mechanical one, where the cause always precedes the effect.

"But although the product of art is the nearest cause of its own production it is not the primary one; it is itself the result, not of a cause to be found in the material world, but of a *foreign* interference in the mechanical causality, and points therefore to a supernatural ground which by a closer investigation will be found identical with a living will. The will feels the want of other things than those natural forces can spontaneously produce. Natural products act as incentives on the will, spur it to break through mechanical causality so that physical laws by a judicious guidance may be forced to produce artificial products that better satisfy the desires of the will. If natural laws could comprehend and judge these things they would

consider them all as miracles, whereas, from the point of view of the will, they are so much the more natural as they are exact expressions of the needs and desires of the will.

"But not only the order of cause and effect, even the tie between the two, is entirely different in teleological causality from that in mechanical. While the natural product is an effect that cannot fail to appear, the product of art on the contrary is an effect that primarily never could be expected, because it has no cause in the material world; but further, if it is forthcoming, the tie between cause and effect is so loose, that such a product may be left and will remain in any stage of its production. It may be just commenced, half ready, or nearly completed; be better or worse, be a failure and so on, whereas the natural product springs forth of physical necessity from its cause, and never can be different from what it is.

"Wills and physical forces then stand against each other as two fundamentally and radically different causes. A will may neglect to do what it ought to, may be idle, industrious, undecided; a physical force cannot leave undone what it has to do, can never be called idle, industrious or undecided.

That man is able to produce objects of art we have sufficient evidence in material invention from the simple stone-ax up to the most complicated machines. But if man can create products of art he must himself be a supernatural cause as natural products produce nothing but their own kind. And not only he, but also the beings that build up his organism must be supernatural causes as we have seen that all organic matter *ipso facto* is a product of art."

The sum total of human experience is composed of ponderable matter, measurable energy, life-force and its manifestations in organization, feelings, sentiments and thoughts. The two first items, surely, belong to the material world. They are the only ones that so far have constituted the field of research of natural science, and if Björklund's theory is right, they will forever so remain. The latest investigations into the nature of corpuscles go far towards making us believe that ponderable matter is also nothing but a form of physical energy, so that science will ultimately have to treat *measurable energy* by mathematics only. Will life-force with its manifestations of organization, love, hate, thoughts, etc., ever be laid under the domain of this science, will the results of our individual characters even *in abstracto* be subject to mathematical investigation? However incredible such an outcome may seem, we

were not justified in saying, "Impossible," until Björklund proved the intrinsic incompatibility between physical energy and life-force.

Life consequently has none of its roots in the material world. The form in which this world exists is, negatively expressed, limitation by time and space. Thoughts and feelings just as much as their cause, life, fall outside of these limitations or are immortal. "Immortality, then, belongs to every living cell as materiality to matter." The form too, as defined by Dr. Carus, is immortal for the same reason, but we have seen that nature, left to itself, would never have created one single organized form because the tendency of nature is to tear down every "form." Life appears in forms, but life is primary, form secondary. And how fortunate this is. Form, belonging to an immortal spirit, possesses unlimited immortality, but form, torn from life, is endowed with a queer kind of immortality which ends when humanity ends on earth. And as the final destruction of the world is a scientific fact, all the inhabitants of Tellus cease in that moment to exist. For a man, be he ever so real, does not exist alone in empty space, because there is nothing to react upon him; and Dr. Carus's "form" lives only as long as it is in organic touch with living generations. But I do not see where the reactions upon his form will come from when this globe is uninhabitable, unless the very matter of our earth is so transformed because of its existence that it will enter into different combinations when forming another planet than it would if it never had served to clothe a human being. Widely different of course is the immortality of a spirit unlimited by time and space.

Dr. Carus objects to a dualistic world-system but if he upbuilds his cosmos of physical energy and life force, calling the latter an energy *sui generis,* I for one cannot see why Björklund merits the title dualist more than Dr. Carus. In order to bring unity into the whole Dr. Carus must show the relationship between these two kinds of energy or at least, in order to bring the question under discussion again, overthrow Björklund's proof of their non-relationship. And if the manifestations of both are "equally mysterious' which indeed they are as we have as yet not discovered the fountain of either, why should Björklund's explanation be less acceptable to a rational mind than Dr. Carus's preservation of a form that physical energy never has shown a tendency to create or maintain?

We may suppose that Dr. Carus now admits the impossibility of *generatio spontanea* and accepts a dualism of physical force and life-force but declares both to be phenomena belonging to time and

space. But then his preservation of form suffers the limitation referred to above, and what is more important, his system gives no explanation of the teleological order in the realm of life. A spiritual world that utilizes physical energy to certain ends and as an *evolutionary part* or *side* of its activity, offers on the other hand a satisfactory solution of these problems.

After having established that life is not "of this world" Björklund proceeds to analyze the organization of life, and we come now to that part of the book that has suggested its title.

Björklund has thoroughly studied modern cytology, and in it he finds strong reasons to regard every living cell as being ensouled with individual life in no lesser sense than man himself. Man is an individual composed of lower individuals, the cells, but he is himself a cell in an individual of higher order, humanity. We are able to comprehend in part only those beings next below and next above man: below the cells and above humanity there must be other living units until we reach the unifying soul of all life, the living God. Thus we, and the cells with us, are all living members in God's perfect organism. We are indispensable to the existence of God and He to ours. This does not mean that either man or God is lacking in personal individuality. The self-dependence and yet interdependence between any being and its lower constituents, is very fully discussed by Björklund.

We shall now endeavor briefly to follow this discussion.

Experiments carried out with animals show that the cell organization will remain alive and perform all vegetative processes even if deprived of the direct guidance of the animal soul. And similar observations have been made on men under certain conditions. Thus it is certain beyond doubt that the cells not only execute but, through the central nerve-system, regulate and control a multitude of functions in which the soul does not take part. But just as certain it is that there are many functions which the cells could not perform without the cooperation of the soul. Vision, hearing, smelling, tasting and feeling would be entirely meaningless to the cells without the aid of the soul. The same is in a high degree the case with the motions of the body which also require such a higher guidance. Deprived of its brain, "the dove could fly, the dog walk, and so forth, but the motions were relatively purposeless. The predetermined plan was lacking. The cells could assimilate the food, when brought into the body, but they could not search it in nature. Such action

requires a power of combination that exceeds their measure of intelligence."

"We see consequently that the cells may do without the soul in such functions as are not related to the exterior world, comprehensible to our senses. Here they need the guidance of a higher, more developed intelligence. In the outside world with its more complicated relations the soul is to the cells very nearly what we mean by the word *Providence*. The soul performs in the interest of the cells, such a higher, regulating and guiding function."

Björklund complains that the cells are continually studied from man's point of view but what man may be from the cell's point of view is never thought of: "We do not hereby deny to the old conception all justification. The body *is* also an organ for the soul. The latter, as experience shows, uses the body for its own specific purposes. But this takes place only to a somewhat limited extent. The incomparably larger part of the soul's work, cares and endeavors are devoted to find means for satisfying the bodily wants. But so far as the soul provides for the necessities of the body it acts as organ for the cells. When man believes that he is running his own errands he is in reality carrying out the missions of those beings that compose his body. These latter demand for their purposes, if not all, yet at least the largest part of the work the soul performs in this world."

Björklund further draws an admirable comparison between the organization of the cells and the organization of mankind, and shows how the cells in their sphere have reached a much higher degree of perfection than man has as yet in his realm of existence.

But let us return to the relationship between man and cells, or which is the same, between soul and body. It is very difficult now to avoid quoting Björklund *in extenso,* and we shall only be able to suggest the author's line of thought and refer the interested student to the book itself for obtaining the demonstration.

The cells and the soul live in entirely separate realms and their constitution is so different that they need not even be aware of each other's existence. And yet a continuous cooperation and intercommunication takes place. The connecting link is *the organism per se.* "From the point of view of the cells, the organism, with its different members and organs, was nothing but the collective expressions of individual wants. Now man comprehends as his needs only the wants of the organs; in other words, the collective wants of the cells are the individual wants of the soul. Experience teaches us that the

soul has no direct comprehension of the cells but only of their organic unions. To prove this it may be sufficient to point out that before the discovery of the microscope man knew absolutely nothing of the existence of these beings, much less that they were the all-governing forces in his own body. But also in other ways we may ascertain that the comprehending power of the soul does not reach beyond the organs. This is apparent from the different significance the physiological processes have for the soul and for the cells. If we consider the most important of them all, our nutrition, and ask ourselves for whom the nourishment is really intended, we find that it is for the cells and for the cells alone.

"The food benefits the soul only if it is utilized by the cells. But the nourishment that the soul craves, does not satisfy the cells. Hunger and satisfaction are not even simultaneous in both, at least not as regards the same food. As a rule the soul comprehends hunger when the cells are satisfied and *vice versa*. The soul's hunger ceases the moment suitable food in sufficient quantity is introduced in the stomach. But this does not help the cells. Because, if the food remained in the stomach, to the satisfaction of the soul, the cells would soon die of starvation. The nourishment in the stomach is of the same importance to the cells as the provisions stored in the warehouse of the community are to the human individuals. These also would die from hunger if they let the provisions remain in the stores. The people must undertake to distribute, prepare and consume the food. Similarly the cells would starve to death unless they prepared the food in their common storage to suit their wants. The nourishment must be transformed into blood through the whole complicated process we call digestion. When this is done the cells are able to satisfy their craving, and simultaneously a new hunger feeling arises in the soul. Although it is the *same food* that satisfies both parties it is the same food in different form, at a different time and in a different mode. We are concerned with dissimilar beings possessed of wants, at once different and yet most intimately associated.

"The connection is not difficult to understand. When the soul comprehends the need of the stomach it is the collective wants of the cells that comes to expression as the individual want of the soul. The different needs receive in different form an identical substance, and this fact is obviously the connecting link between the soul and the cells. We might carry out the same reasoning in regard to the respiration and all the other physiological processes of the body."

"The soul therefore is potentially present in the cells in the form of their higher wants and is consequently developed along with the upbuilding of the body. Only when this is ready is the soul's entity developed. The soul must then comprehend the organism as its particular body when conscious of its own ego, but the cells do not enter into the soul's entity as individuals and are not present as such in man's consciousness.

"For this organic cooperation the soul and the cells need no language, no sign to communicate with each other. It is not even necessary that they are aware of each other's existence. It is sufficient that each party comprehends its own wants and acts for their satisfaction according to its own nature. If they do this, their cooperation through the body receives a simple and at the same time complete explanation.

"But however natural this interaction is, it is nevertheless a wonder above all wonders. The world that exists to the soul does not exist to the cells and *vice versa*. They have an entirely different conception of the realm in which they live. They have different apprehensions, feelings and wants and perform accordingly different functions. But in spite of this they are, as we have seen, within certain limits so intimately connected that these different comprehensions and labors are interlinked with each other, regulating one another as accurately as the wheels in a clock.

"From the relationship existing between the soul and the cells it appears that the former cannot live a life independent of the latter. The soul receives its entire individuality, all its qualities, forces and faculties through the organism built by the cells, which therefore must exist before the soul can exist as the real unity in the organism. This does not mean that the soul is an empty form void of independent substance. Even before the cells have combined into an organic unit the soul is potentially present in them in the form of the wants that force them to upbuild the organism, and this organism is that of the soul, not that of the cells of which each possesses its individual organism.

"But if the soul is potentially present in the cells it is only through them that it can arise to a higher life. We have already shown in another connection that a direct transposition would be useless and meaningless. Endowed with its present organs adapted to earthly conditions, a man suddenly translated into the glories of a higher world, would with seeing eyes see nothing, with hearing ears hear nothing and with feeling senses feel nothing. To compre-

hend what there exists and happens, man's own organism must have undergone a corresponding radical transformation. He must have new, more perfect senses, higher spiritual and bodily faculties, differing from his present as far as the objects in this higher world differ from those on earth. This transfigured body can only be organized by the same beings that build it here in time. The soul is inseparably united with these beings and is where they are.

"Here in time man commences with a cell and with a cell he must begin in a future life. This first cell with which man enters his next form of existence cannot logically be any other than the first dying cell-individual. As no atom, so no elementary unit of the living spiritual body, is annihilated. Viewed from our present existence death cannot mean anything to the departed cell-generations but the cessation of life and activity in the world responsive to our senses. In reality they rise to a higher evolution under different conditions and this evolution must be identical with the upbuilding of the glorified body man shall possess in a future life.

"This form of death and resurrection, natural because it is founded in the idea and nature of the organism, is common to all living beings, and must be so, as they are all built according to the same general plan and therefore essentially subject to the same evolutionary processes. The birth and death of the lower individuals in whole generations is known to be a universal phenomenon in every organism."

"If the soul enters as a real part in every individual cell it does not belong differently to the first generation than to the last, or to the whole series of intermediary generations. But here in time man lives only in the generation existing at the present moment. The generations that in the past successively formed the spiritual substance of his body have already gone out of time and those that are coming have not yet made their entrance. Man's entity is thus split or distributed upon a series of successively existing moments each of which contains only a certain limited part of the organism, and the latter has therefore in reality a far broader extent than is seen at present."

It now only remains for Björklund to treat the highly philosophical problem, why living parts in an infinite being must undergo an evolution in time. After having pointed out that his theory of death and resurrection necessarily includes the belief in man's preexistence, and after further having emphasized the difference between his conception and those older creeds which consider man as

living a life *separate* from that of God, Björklund continues in this connection:

"It is the perennial honor of Sweden's greatest philosopher Christofer Jacob Boström, to have satisfactorily explained this extremely difficult and complicated question. He has shown that man exactly on the supposition that he is an eternal part of God's being requires and must go through an evolution in time. According to Boström religious intuition has found the truth that man is an eternal idea in God, a living member in His organism. But Boström has also understood and considered the difference implied in thinking of man as a member in God's organism and in thinking of this member as living its independent life. In the former case man possesses the same qualities as God; in the latter, these qualities with corresponding limitations.

"For an illustration of how all limited beings are incorporated in an absolute personality, Boström likes to fall back on the numerical system. Spiritual beings form a series, as it were, of lower and higher entities, where the latter contain the former pretty much as higher numbers contain the smaller."....

"But if Boström had lived to study modern cytology he would have found a more adequate comparison within man's organism, and one that perhaps in several respects would have modified his conception of the world of divine ideas.

"God is related to man, as man is, not to the cell, but to the lower units of which the cell is composed. Between God and man there is at least one other organism that we know of, namely humanity. But if we overlook this and for simplicity's sake imagine the relationship as that of man to the cell, it should be evident from what has been previously said, that man is and must be something else to God than he is to himself.

"To God he is what the cell is to man, a living part in His organism, and in this capacity he possesses all the perfect qualities of that organism. Living his independent life, man is in the same position as the cell in his own being, when the cell is thought of as living the life it is confined to by its less perfect organism.

"Although limited to that life the cell may literally be said to be man's image—but an image of a very singular kind. The cell does not reproduce man's traits as does a photograph or a statue, but within its lower realm it mirrors the fundamental qualities of the original on a very reduced scale.

"These limitations cannot be conceived by the cell as such be-

cause they are natural to it and belong to its entity. The cell is and must feel itself as perfect in its realm as man in his. Only if the cell could compare its condition with man's these limitations would become apparent to it, and such a comparison the cell really undertakes within certain limits. Into each feeling of want enters a comparison between the possessed and the desired. In the higher wants then, that drive the cells to upbuild man's organism we have a manifestation of such comparing power of the cell. Experience shows that the cell may live in a veritable natural state, but it is also, because of the presence of the soul in its innermost being, capable of a high culture, for the development of which it receives constant impulses and stimulations from the soul.

"In the same sense man may be said to be the image of God. Living in the world and in the natural state, to which he is confined by his relatively imperfect organism, man has the qualities of God with corresponding limitations. But even in this state he feels the spirit of God present in him because he is an original part of God's own organism. In his conscience and his religious feeling man not only comprehends distinctly the presence of God in his inner being but constantly receives also impulses, incitements and inspirations to develop that perfect life and heavenly kingdom, of which he is called by his high origin and divine birth to become a citizen.

"What the conscience and the religious feelings are to the will, the logical laws of thinking are to the reason, and in the latter man finds God again as immediately present as in the former. Indeed the logical laws are the form in which God himself exists.

"Because of God's presence in the eternal laws of our thinking man is able to appraise himself and his condition with an absolute measure and he can in this way obtain a certain knowledge of God's world and of his perfect qualities. He has only to abstract all wants and limitations from such qualities as have a positive content, because lack of want is perfectness."

In the following comparison between the finite and the infinite Björklund rises to a truly poetical height, but we must spare this part to a reading of the book itself.

"In this light, in this perfectness, man is a part of the divine entity. This life in God's eternal consciousness is man's primary and original existence. Only in a secondary meaning is he a self-existent personality, and is then no more identical with God than the cell is with man.

"Man as an entity for himself must have the natural limitations

of the part. Conceived by God man is eternal in the divine sense, but conceived by himself man's eternal life is clothed in the limitations we call time. The eternal was a constant present without beginning or end, without past or future. What is present to man must suffer these limitations; in other words, man must be born, must go through an evolution, or what is the same, become to himself what he has been eternally to God. In this respect man's relation to God may be compared to the relation of a newborn child to its earthly father. To him the nature and scope of the child is perfectly clear, but the child is unconscious of it and must awake to an understanding thereof, that is to say, must become to itself what it already is to its father.

"Living beings form a continuous series in the absolute organism. This series is such that the higher beings form the conditions and supports of the lower. This connection must be entirely reversed during evolution itself which naturally proceeds from the lower to the higher. In time therefore the generation and development of the lower beings must precede that of the higher. We have also seen that the evolution of the former is identical with the upbuilding of the organisms of the latter, and we understand now that the whole process *must* essentially follow the course which, as we have previously shown, it does in fact actually take.

"It is further the inherent idea of time that man's eternal entity cannot appear whole and undivided. He must plot it out along a series of successive moments which make room for only one cell-generation at a time. As the cell's entity again has a less comprehensive content than man's, its lifetime must be correspondingly shorter."

* * *

Dr. Carus says in a letter to me that he does not see how Björklund's theory, interesting as it is, can be of any special value to religious or emotional life. A strange statement! Altogether apart from the question, whether it comes nearer truth than that of Dr. Carus or not, it first of all grants individual immortality to all living beings, whereas our life only lasts as long as humanity exists on earth according to Dr. Carus, as far as I can see. But of a widely greater emotional value is the relationship between God and man, which it intimates. If man on a small scale acts as Providence for the myriads of cells that compose his organism, an almost magic light is at once thrown on numerous questions which we but dimly understand from our point of view as cells in a higher organism,

but which we easily comprehend when considering ourselves the living unifying souls of communities of lower individuals. No warm prayer of an assembly of cells is unheard. The hunger feeling is satisfied if all the members do their duty at the soul's command. The pain in the finger speedily starts the soul to bring relief. The close interdependence between all the individuals in the ideal socialistic state organized by the cells in the body of man, is set forth, for instance, in the suffering of the head when the blood circulation in the feet ceases to function properly; this, to the utter astonishment of the communities in the head who are aware of no fault of their own. An "earthquake" takes place when the soul directs the surgeon's knife to cut deeply into an organ, thereby prematurely it would seem bringing this existence to an end for thousands of innocent individuals who cannot possibly see the "divine" reason; and a scientist among the cells would find no fault with the "natural" course of the catastrophe; the terrible wedge that brought the disaster, obeyed nothing but known natural laws. And so the parallel may go on almost *in infinitum*.

MONTCLAIR, NEW JERSEY. J. E. FRIES.

PLATO'S "IDEA" AND ARISTOTLE'S "ENTELECHY."

Plato's "Idea" was in reality the idea of God, the Creator, and not of his finite creatures who in all their sciences, as Kepler and Agassiz truly say, "only think God's thoughts after Him." "Ideas" belonged before creation, to God's foreknowledge and foreordination.

Aristotle justly complained that Plato did not connect his "ideas" with actual things. This was the missing link, which undermined his philosophy. Only a personal God can connect fore-ordination with actual existence.

Aristotle "felt after," if he did not fully reach, God, in his doctrine of the Entelechy (ἐντελέχεια: the holding, or completing, ἔχειν, of the end, τέλος); i. e., the complete actualization of an existing thing by the fiat of God, as contrasted with the mere potential idea or possible existence of it in the foreknowledge and fore-ordination of God before the work of creation.

Both Plato and Aristotle were, like all men, limited and like all since Adam, fallen. Yet they were intellectual Titans, struggling like Hercules, to tear asunder the coils of the serpent which binds depravity. Both saw as through a glass darkly; saw men, as trees,

the January number, might suggest the possibilities of extending those methods of construction into Nasik cubes. It is an interesting proposition and might lead to many surprising results.

Although the cube to be described here is not exactly of the nature mentioned above, it follows similar principles of construction and involves features quite unusual to cubes of this class.

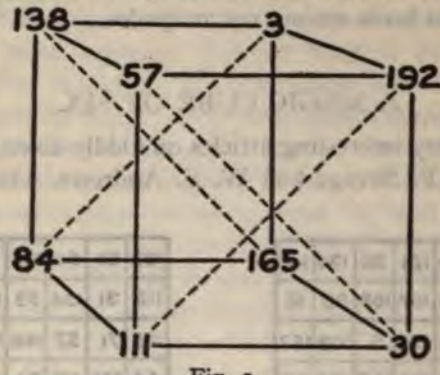


Fig. 2.

The six respective layers of this cube are shown in Fig. 1. All of its 108 columns, and its four oblique diagonals give the constant summation of 651. If we divide this into 27 smaller cubes, which we will call cubelets, of eight cells each, the six faces, and also two diagonal planes of any cubelet give constant summations. For example, we will note the central cubelet of the first and second layer, which is shown diagrammatically in Fig. 2. Its summations are as follows.

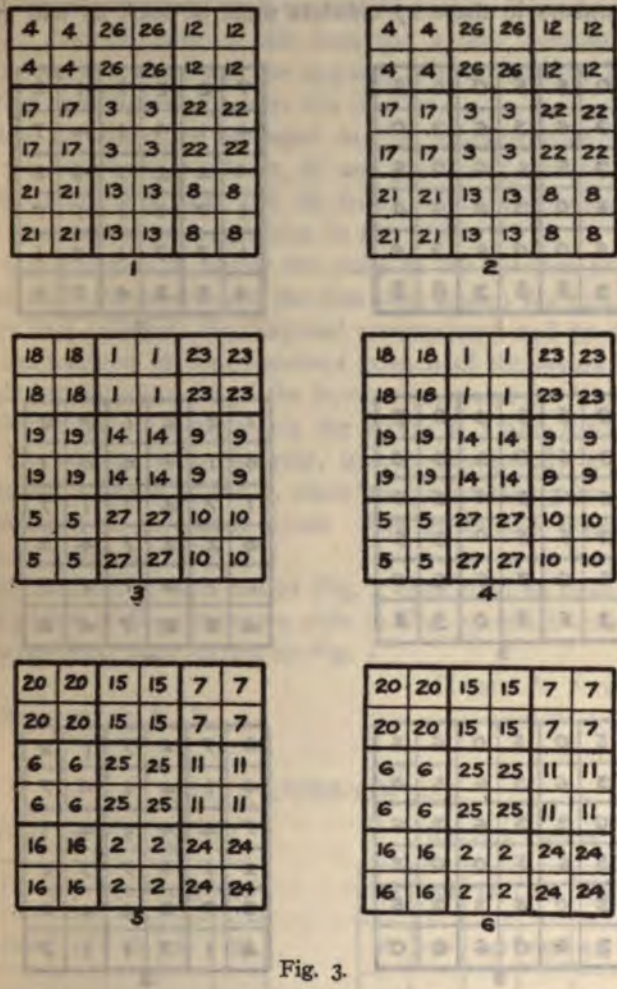
The six faces:

57	138	138	84	57	192
192	3	3	165	111	30
30	165	192	30	84	165
111	84	57	111	138	3
390	390	390	390	390	390

The two diagonal planes:

57	192
30	111
165	84
138	3
390	390

Also, if the sum of the eight cells in each of the cubelets be taken as a whole, we have a $3\times3\times3$ cube with 37 summations, each amounting to 2604.



4	4	26	26	12	12
4	4	26	26	12	12
17	17	3	3	22	22
17	17	3	3	22	22
21	21	13	13	8	8
21	21	13	13	8	8

1

4	4	26	26	12	12
4	4	26	26	12	12
17	17	3	3	22	22
17	17	3	3	22	22
21	21	13	13	8	8
21	21	13	13	8	8

2

18	18	1	1	23	23
18	18	1	1	23	23
19	19	14	14	9	9
19	19	14	14	9	9
5	5	27	27	10	10
5	5	27	27	10	10

3

18	18	1	1	23	23
18	18	1	1	23	23
19	19	14	14	9	9
19	19	14	14	9	9
5	5	27	27	10	10
5	5	27	27	10	10

4

20	20	15	15	7	7
20	20	15	15	7	7
6	6	25	25	11	11
6	6	25	25	11	11
16	16	2	2	24	24
16	16	2	2	24	24

5

20	20	15	15	7	7
20	20	15	15	7	7
6	6	25	25	11	11
6	6	25	25	11	11
16	16	2	2	24	24
16	16	2	2	24	24

6

Fig. 3.

The construction of this cube is by La Hireian method, using two primary cubes, which are shown in Figs. 3 and 4. Fig. 3 contains 27 cubelets, each containing eight cells with eight equal numbers; the numbers in the respective cubelets ranking in order as the series, 1, 2, 3,....27. These 27 cubelets are arranged according to

To construct the cubelet, we divide the above series into two sets of four numbers each, so that the sums of the two sets are equal, and the complementaries of one set are found in the other. This division is 0, 5, 6, 3 and 7, 2, 1, 4, which separates the complementaries and gives two sets, each amounting to 14. We can place one set in any desired order on one face, and it only remains to place the four complementaries in the opposite face, so that the four lines connecting complementary pairs are parallel.

These cubelets are arranged in the primary cube with the 0, 5, 6, 3 faces placed in the 1st, 3d, and 5th layers, and the 7, 2, 1, 4 faces placed in the 2d, 4th, and 6th layers, which arrangement satisfies the summations perpendicular to the layers.

It now remains to adjust the pairs in the cubelets to suit the summations in the layers and the four diagonals. We first arrange the pairs that will give the diagonal summations, and by doing so, we set the position of four numbers in each of the layers 3 and 4, and eight numbers in each of the layers 1, 2, 5 and 6. We then arrange the remaining numbers in the layers 1, 3 and 5 to suit the twelve summations of each layer, which consequently locates the numbers for layers 2, 4 and 6, since complementary pairs must lie perpendicularly to the cubes layers. This gives us a primary cube such as that shown in Fig. 4.

The numbers in each cell of Fig. 4 must then be multiplied by 27, and added to the respective cells in Fig. 3, which combination gives us the final cube shown in Fig. 1.

HARRY A. SAYLES.

SCHENECTADY, N. Y.

MAGIC CUBE ON SIX.

FIRST OR TOP SQUARE.

106	8	7	212	209	109
199	116	113	16	12	195
196	114	115	11	15	200
21	203	202	103	100	22
17	205	208	99	104	18
112	5	6	210	211	107

SECOND SQUARE.

166	130	129	32	30	164
37	152	148	137	143	34
33	151	150	142	140	35
128	41	47	157	154	124
126	46	44	155	153	127
161	131	133	28	31	167

THIRD SQUARE.

163	135	136	25	27	165
36	145	149	144	138	39
40	146	147	139	141	38
121	48	42	156	159	125
123	43	45	158	160	122
168	134	132	29	26	162

FOURTH SQUARE.

55	192	191	83	81	49
93	60	57	176	174	91
89	62	63	172	175	90
182	74	77	70	65	183
180	75	73	68	71	184
52	188	190	82	85	54

FIFTH SQUARE.

50	185	186	86	88	56
92	61	64	169	171	94
96	59	58	173	170	95
179	79	76	67	72	178
181	78	80	69	66	177
53	189	187	87	84	51

SIXTH OR BOTTOM SQUARE.

111	1	2	213	216	108
194	117	120	9	13	198
197	119	118	14	10	193
20	206	207	98	101	19
24	204	201	102	97	23
105	4	3	215	214	110

In the cube, whose horizontal squares are here shown, the sum of each of the normal rows (those perpendicular to the faces of the cube) is 651, and the sum of each of the sixteen diagonals connecting the corners of the cube is the same.

These diagonals include the entire diagonals of the surfaces of the cube and the four diagonals of the solid running from corner to corner through the center of the cube.

DIAGONALS.

Top Square.	106	116	115	103	104	107
	109	12	11	202	205	112
Bottom Square.	111	117	118	98	97	110
	108	13	14	207	204	105

Front Square.	112	131	132	82	84	110
	107	31	29	190	189	105
Rear Square.	106	130	136	83	88	108
	109	30	25	191	185	111
Left Square.	106	37	40	182	181	105
	112	126	121	89	92	111
Right Square.	109	34	38	183	177	110
	107	127	125	90	94	108
Diagonals of the Solid.	106	152	147	70	66	110
	109	143	139	77	78	105
	107	153	156	63	61	111
	112	46	42	172	171	108

The foregoing cube was constructed in the following manner. The foundation of this construction is the cube on 3 which is shown in the following squares.

FIRST OR TOP SQUARE

19	5	18
17	21	4
6	16	20

SECOND OR MIDDLE SQUARE.

15	25	2
1	14	27
26	3	13

THIRD OR BOTTOM SQUARE

8	12	22
24	7	11
10	23	9

The sum of each normal row in the above cube, whether running from left to right, from rear to front or from top to bottom, is 42; and the sum of each diagonal of which the central term 14 is a member, as 19 14 9, 5 14 23, 15 14 13, etc., is also 42.

Deduct 1 from each term of the above cube and multiply the remainder by 8. With each of these multiples construct a cubic group consisting of eight repetitions of the multiple. Substitute each of these groups for that term of the cube from which it was derived, and the result will be a cube with six terms in each row. The horizontal squares of this cube are shown in the following figures, the second square being the same as the first, the fourth as the third, and the sixth as the fifth.

THE COMPLETE CUBE.

FIRST OR TOP SQUARE.

147	146	40	38	141	139
149	145	36	39	138	144
136	135	163	165	27	25
132	134	168	162	26	29
45	43	123	122	160	158
42	48	121	125	159	156

SECOND SQUARE.

150	151	33	35	140	142
148	152	37	34	143	137
129	130	166	164	30	32
133	131	161	167	31	28
44	46	126	127	153	155
47	41	128	124	154	157

THIRD SQUARE.

115	114	196	200	15	11
113	116	199	195	12	16
7	8	106	109	209	212
6	5	112	107	211	210
208	205	17	18	104	99
202	203	21	22	100	103

FOURTH SQUARE.

118	119	197	193	10	14
120	117	194	198	13	9
2	1	111	108	216	213
3	4	105	110	214	215
201	204	24	23	97	102
207	206	20	19	101	98

FIFTH SQUARE.

58	59	96	95	170	173
64	61	92	94	171	169
186	185	50	56	88	86
187	189	53	51	84	87
80	78	181	177	66	69
76	79	179	178	72	67

SIXTH OR BOTTOM SQUARE.

63	62	89	90	175	172
57	60	93	91	174	176
191	192	55	49	81	83
190	188	52	54	85	82
73	75	180	184	71	68
77	74	182	183	65	70

THE FINAL CUBE.

In the complete cube, just given, the middle two squares in each direction are magical while the outer squares are not.

To bring these magical squares to the surface the squares of each set of parallel squares may be permuted as follows:

Original order 1, 2, 3, 4, 5, 6,
Permuted order .....3, 2, 1, 6, 5, 4.

The result is the final cube shown in the beginning of this article.

The above permutation is subject to two conditions. The several sets of parallel squares must all be permuted in the same manner. Any two parallel squares which in the original cube are located on opposite sides of the middle plane of the cube and at an equal distance from it, in the permuted cube must be located on opposite sides of the middle plane of the cube and at an equal distance from it. These conditions are for the protection of the diagonals.

JOHN WORTHINGTON.

MAGIC IN THE FOURTH DIMENSION.

Definition of terms: *Row* is a general term; *rank* denotes a horizontal right-to-left row; *file* a row from front to back; and *column* a vertical row in a cube—not used of any horizontal dimension.

If n^2 numbers of a given series can be grouped so as to form a magic square and n such squares be so placed as to constitute a magic cube, why may we not go a step further and group n cubes in relations of the fourth dimension? In a magic square containing the natural series $1 \ldots n^2$ the summation is $\frac{n(n^2+1)}{2}$; in a magic cube with the series $1 \ldots n^3$ it is $\frac{n(n^3+1)}{2}$; and in an analogous fourth-dimension construction it naturally will be $\frac{n(n^4+1)}{2}$.

With this idea in mind I have made some experiments, and the results are interesting. The analogy with squares and cubes is not perfect, for rows of numbers can be arranged side by side to represent a visible square, squares can be piled one upon another to make a visible cube, but cubes cannot be so combined in drawing as to picture to the eye their higher relations. My expectation *a priori* was that some connection or relation, probably through some form of diagonal-of-diagonal, would be found to exist between the cubes containing the n^4 terms of a series. This particular feature did appear in the cases where n was odd. Here is how it worked out:

I. When n is odd.

1. Let $n=3$, then $S=123$.—The natural series $1 \ldots 81$ was divided into three sub-series such that the sum of each would be

one-third the sum of the whole. In dealing with any such series when n is odd there will be n sub-series, each starting with one of the first n numbers, and the difference between successive terms will be $n+1$, except after a multiple of n, when the difference is 1. In the present case the three sub-series begin respectively with 1, 2, 3, and the first is 1 5 9 10 14 18 19 23 27 28 32 36 37 41 45 46 50 54 55 59 63 64 68 72 73 77 81. These numbers were arranged in three squares constituting a magic cube, and the row of squares so formed was flanked on right and left by similar rows formed from the other two sub-series (see Fig. 1).

It is not easy—perhaps it is not possible—to make an absolutely perfect cube of 3. These are not perfect, yet they have many

I			II			III		
25	38	60	28	77	18	67	8	48
33	79	11	72	1	50	21	40	62
65	6	52	23	45	55	35	75	13
29	78	16	68	9	46	26	39	58
70	2	51	19	41	63	31	80	12
24	43	56	36	73	14	66	4	53
69	7	47	27	37	59	30	76	17
20	42	61	32	81	10	71	3	49
34	74	15	64	5	54	22	44	57

Fig. 1. (3^4)

striking features. Taking the three cubes separately we find that in each all the "straight" dimensions—rank, file and column—have the proper footing, 123. In the middle cube there are two plane diagonals having the same summation, and in cubes I and III one each. In cube II four cubic diagonals and four diagonals of vertical squares are correct; I and III each have one cubic diagonal and one vertical-square diagonal.

So much for the original cubes; now for some combinations. The three squares on the diagonal running down from left to right will make a magic cube with rank, file, column, cubic diagonals, two plane diagonals and four vertical-square diagonals (37 in all) correct. Two other cubes can be formed by starting with the top squares of II and III respectively and following the "broken diag-

onals" running downward to the right. In each of these S occurs at least 28 times (in 9 ranks, 9 files, 9 columns and one cubic diagonal). Various other combinations may be found by taking the squares together in horizontal rows and noting how some columns and assorted diagonals have the proper summation, but the most important and significant are those already pointed out. In all the sum 123 occurs over 200 times in this small figure.

I					II					III					IV					V				
317	473	604	10	161	192	348	479	510	36	67	223	354	385	536	567	98	229	260	411	442	598	104	135	286
110	136	292	448	579	610	11	167	323	454	485	511	42	198	329	360	386	542	73	204	235	261	417	573	79
423	554	85	236	267	298	429	585	111	142	173	304	460	611	17	48	179	335	486	517	548	54	210	361	392
211	367	398	529	60	86	242	273	404	560	586	117	148	279	435	461	617	23	154	310	336	492	523	29	185
504	35	186	342	498	379	535	61	217	373	254	410	561	92	248	129	285	436	592	123	4	160	311	467	623
606	12	168	324	455	481	512	43	199	330	356	387	543	74	205	231	262	418	574	80	106	137	293	449	580
299	430	581	112	143	174	305	456	612	18	49	180	331	487	518	549	55	206	362	393	424	555	81	237	268
87	243	274	405	556	587	118	149	280	431	462	618	24	155	306	337	493	524	30	181	212	368	399	530	56
380	531	62	218	374	255	406	562	93	249	130	281	437	593	124	5	156	312	468	624	505	31	187	343	499
193	349	480	506	37	68	224	355	381	537	568	99	230	256	412	443	599	105	131	287	318	474	605	6	162
175	301	457	613	19	50	176	332	488	519	550	51	207	363	394	425	551	82	238	269	300	426	582	113	144
588	119	150	276	432	463	619	25	151	307	338	494	525	26	182	213	369	400	526	57	88	244	275	401	557
251	407	563	94	250	126	282	438	594	125	1	157	313	469	625	501	32	188	344	500	376	532	63	219	375
69	225	351	382	538	569	100	226	257	413	444	600	101	132	288	319	475	601	7	163	194	350	476	507	38
482	513	44	200	326	357	388	544	75	201	232	263	419	575	76	107	138	294	450	576	607	13	169	325	451
464	620	21	152	308	339	495	521	27	183	214	370	396	527	58	89	245	271	402	558	589	120	146	277	433
127	283	439	595	121	2	158	314	470	621	502	33	189	345	496	377	533	64	220	371	252	408	564	95	246
570	96	227	258	414	445	596	102	133	289	320	471	602	8	164	195	346	477	508	39	70	221	352	383	539
358	389	545	71	202	233	264	420	571	77	108	139	295	446	577	608	14	170	321	452	483	514	45	196	327
46	177	333	489	520	546	52	208	364	395	421	532	83	239	270	296	427	583	114	145	171	302	458	614	20
3	159	315	466	622	503	34	190	341	497	378	534	65	216	372	253	409	565	91	247	128	284	440	591	122
441	597	103	134	290	316	472	603	9	165	191	347	478	509	40	66	222	353	384	540	566	97	288	259	415
234	265	416	572	78	109	140	291	447	578	609	15	166	322	453	484	515	41	197	328	359	390	541	72	203
547	53	209	365	391	422	553	84	240	266	297	428	584	115	141	172	303	459	615	16	47	178	334	490	516
340	491	522	28	184	215	366	397	528	59	90	241	272	403	559	590	116	147	278	434	465	616	22	153	309

Fig. 2. (5^4)

One most interesting fact remains to be noticed. While the three cubes were constructed separately and independently the figure formed by combining them is an absolutely perfect square of 9, with a summation of 369 in rank, file and corner diagonal (besides all "broken" diagonals running downward to the right), and a perfect

balancing of complementary numbers about the center. Any such pair, taken with the central number 41, gives us the familiar sum 123, and this serves to bind the whole together in a remarkable manner.

2. Let $n=5$, then S=1565.—In Fig. 2 is represented a group of 5-cubes each made up of the numbers in a sub-series of the natural series 1...625. In accordance with the principle stated in a previous paragraph the central sub-series is 1 7 13 19 25 26 32 ... 625, and the other four can easily be discovered by inspection. Each of the twenty-five small squares has the summation 1565 in rank, file, corner diagonal and broken diagonals, twenty times altogether in each square, or 500 times for all.

Combining the five squares in col. I we have a cube in which all the 75 "straight" rows (rank, file and vertical column), all the horizontal diagonals and three of the four cubic diagonals foot up 1565. In cube III all the cubic diagonals are correct. Each cube also has seven vertical-square diagonals with the same summation. Taking together the squares in horizontal rows we find certain diagonals having the same sum, but the columns do not. The five squares in either diagonal of the large square, however, combine to produce almost perfect cubes, with rank, file, column and cubic diagonals all correct, and many diagonals of vertical squares.

A still more remarkable fact is that the squares in the broken diagonals running in either direction also combine to produce cubes as nearly perfect as those first considered. Indeed, the great square seems to be an enlarged copy of the small squares, and where the cells in the small ones unite to produce S the corresponding squares in the large figure unite to produce cubes more or less perfect. Many other combinations are discoverable, but these are sufficient to illustrate the principle, and show the interrelations of the cubes and their constituent squares. The summation 1565 occurs in this figure not less than 1400 times.

The plane figure containing the five cubes (or twenty-five squares) is itself a perfect square with a summation of 7825 for every rank, file, corner or broken diagonal. Furthermore all complementary pairs are balanced about the center, as in Fig. 1. Any square group of four, nine or sixteen of the small squares is magic, and if the group of nine is taken at the center it is "perfect." It is worthy of notice that all the powers of n above the first lie in the middle rank of squares, and that all other multiples of n are grouped in regular relations in the other ranks and have the same

grouping in all the squares of any given rank. The same is true of the figure illustrating 7^4, which is to be considered next.

3. Let $n=7$, then S=8407.—This is so similar in all its properties to the 5-construction just discussed that it hardly needs separate description. It is more nearly perfect in all its parts than the 5^4, having a larger proportion of its vertical-square diagonals correct. Any square group of four, nine, sixteen, twenty-five or thirty-six small squares is magic, and if the group of nine or twenty-five

I				II				III				IV			
1	255	254	4	248	10	11	245	240	18	19	237	25	231	230	28
252	6	7	249	13	243	242	16	21	235	234	24	228	30	31	225
8	250	251	5	241	15	14	244	233	23	22	236	32	226	227	29
253	3	2	256	12	246	247	9	20	238	239	17	229	27	26	232
224	34	35	221	41	215	214	44	49	207	206	52	200	58	59	197
37	219	218	40	212	46	47	209	204	54	55	201	61	195	194	64
217	39	38	220	48	210	211	45	56	202	203	53	193	63	62	196
36	222	223	33	213	43	42	216	205	51	50	208	60	198	199	57
192	66	67	189	73	183	182	76	81	175	174	84	168	90	91	165
69	187	186	72	180	78	79	177	172	86	87	169	93	163	162	96
185	71	70	188	80	178	179	77	88	170	171	85	161	95	94	164
68	190	191	65	181	75	74	184	173	83	82	176	92	166	167	89
97	159	158	100	152	106	107	149	144	114	115	141	121	135	134	124
156	102	103	153	109	147	146	112	117	139	138	120	132	126	127	129
104	154	155	101	145	111	110	148	137	119	118	140	128	130	131	125
157	99	98	160	108	150	151	105	116	142	143	113	133	123	122	136

Fig. 3. (4^4)

be taken at the center of the figure it is "perfect." The grouping of multiples and powers of n is very similar to that already described for 5^4.

II. When n is even.

I. Let $n=4$, then S=514.—The numbers may be arranged in either of two ways. If we take the diagram for the 4-cube as

I						II						III					
1	1295	1294	3	1292	6	1278	20	21	1276	23	1273	37	1259	1258	39	1256	42
1290	8	1288	1287	11	7	25	1271	27	28	1268	1272	1254	44	1252	1251	47	43
1284	1283	15	16	14	1279	31	32	1264	1263	1265	36	1248	1247	51	52	50	1243
13	17	1281	1282	1280	18	1266	1262	34	33	35	1261	49	53	1245	1246	1244	54
12	1286	9	10	1289	1285	1267	29	1270	1269	26	30	48	1250	45	46	1253	1249
1291	2	4	1293	5	1296	24	1277	1275	22	1274	19	1255	38	40	1257	41	1260
1188	110	111	1186	113	1183	127	1169	1168	129	1166	132	1152	146	147	1150	149	1147
115	1181	117	118	1178	1182	1164	134	1162	1161	137	133	151	1145	153	154	1142	1146
121	122	1174	1173	1175	126	1158	1157	141	142	140	1153	157	158	1138	1137	1139	162
1176	1172	124	123	125	1171	139	143	1155	1156	1154	144	1140	1136	160	159	161	1135
1177	119	1180	1179	116	120	138	1160	135	136	1163	1159	1141	155	1144	1143	152	156
114	1187	1185	112	1184	109	1165	128	130	1167	131	1170	150	1151	1149	148	1148	145
217	1079	1078	219	1076	222	1062	236	237	1060	239	1057	253	1043	1042	255	1040	258
1074	224	1072	1071	227	223	241	1055	243	244	1052	1056	1038	260	1036	1035	263	259
1068	1067	231	232	230	1063	247	248	1048	1047	1049	252	1032	1031	267	268	266	1027
229	233	1065	1066	1064	234	1050	1046	250	249	251	1045	265	269	1029	1030	1028	270
228	1070	225	226	1073	1069	1051	245	1054	1053	242	246	264	1034	261	262	1037	1033
1075	218	220	1077	221	1080	240	1061	1059	238	1058	235	1039	254	256	1041	257	1044
865	431	430	867	428	870	414	884	885	412	887	409	901	395	394	903	392	906
426	872	424	423	875	871	889	407	891	892	404	408	390	908	388	387	911	907
420	419	879	880	878	415	895	896	400	399	401	900	384	383	915	916	914	379
877	881	417	418	416	882	402	398	898	897	899	397	913	917	381	382	380	918
876	422	873	874	425	421	403	893	406	405	890	894	912	386	909	910	389	385
427	866	868	429	869	432	888	413	411	886	410	883	391	902	904	393	905	396
864	434	435	862	437	859	451	845	844	453	842	456	828	470	471	826	473	823
439	857	441	442	854	858	840	458	838	837	461	457	475	821	477	478	818	822
445	446	850	849	851	450	834	833	465	466	464	829	481	482	814	813	815	486
852	848	448	447	449	847	463	467	831	832	830	468	816	812	484	483	485	811
853	443	856	855	440	444	462	836	459	460	839	835	817	479	820	819	476	480
438	863	861	436	860	433	841	452	454	843	455	846	474	827	825	472	824	469
756	542	543	754	545	751	559	737	736	561	734	564	720	578	579	718	581	715
547	749	549	550	746	750	732	566	730	729	569	565	583	713	585	586	710	714
553	554	742	741	743	558	726	725	573	574	572	721	589	590	706	705	707	594
744	740	556	555	557	739	571	575	723	724	722	576	708	704	592	591	593	703
745	551	748	747	548	552	570	728	567	568	731	727	709	587	712	711	584	588
546	755	753	544	752	541	733	560	562	735	563	738	582	719	717	580	716	577

Fig. 4, First Part. (6^4:S=3891)

IV						V						VI					
1225	71	70	1227	68	1230	1224	74	75	1222	77	1219	1206	92	93	1204	95	1201
66	1232	64	63	1235	1231	79	1217	81	82	1214	1218	97	1199	99	100	1196	1200
60	59	1239	1240	1238	55	85	86	1210	1209	1211	90	103	104	1192	1191	1193	108
1237	1241	57	58	56	1242	1212	1208	88	87	89	1207	1194	1190	106	105	107	1189
1236	62	1233	1234	65	61	1213	83	1216	1215	80	84	1195	101	1198	1197	98	102
67	1226	1228	69	1229	72	78	1223	1221	76	1220	73	96	1205	1203	94	1202	91
180	1118	1119	178	1121	175	181	1115	1114	183	1112	186	199	1097	1096	201	1094	204
1123	173	1125	1126	170	174	1110	188	1108	1107	191	187	1092	206	1090	1089	209	205
1129	1130	166	165	167	1134	1104	1103	195	196	194	1099	1086	1085	213	214	212	1081
168	164	1132	1131	1133	163	193	197	1101	1102	1100	198	211	215	1083	1084	1082	216
169	1127	172	171	1124	1128	192	1106	189	190	1109	1105	210	1088	207	208	1091	1087
1122	179	177	1120	176	1117	1111	182	184	1113	185	1116	1093	200	202	1095	203	1098
1009	287	286	1011	284	1014	1008	290	291	1006	293	1003	990	308	309	988	311	985
282	1016	280	279	1019	1015	295	1001	297	298	998	1002	313	983	315	316	980	984
276	275	1023	1024	1022	271	301	302	994	993	995	306	319	320	976	975	977	324
1021	1025	273	274	272	1026	996	992	304	303	305	991	978	974	322	321	323	973
1020	278	1017	1018	281	277	997	299	1000	999	296	300	979	317	982	981	314	318
283	1010	1012	285	1013	288	294	1007	1005	292	1004	289	312	989	987	310	986	307
361	935	934	363	932	366	360	938	939	358	941	355	342	956	957	340	959	337
930	368	928	927	371	367	943	353	945	946	350	354	961	335	963	964	332	336
924	923	375	376	374	919	949	950	346	345	347	954	967	968	328	327	329	972
373	377	921	922	920	378	348	344	952	951	953	343	330	326	970	969	971	325
372	926	369	370	929	925	349	947	352	351	944	948	331	965	334	333	962	966
931	362	364	933	365	936	942	359	357	940	356	937	960	341	339	958	338	955
504	794	795	502	797	499	505	791	790	507	788	510	523	773	772	525	770	528
799	497	801	802	494	498	786	512	784	783	515	511	768	530	766	765	533	529
805	806	490	489	491	810	780	779	519	520	518	775	762	761	537	538	536	757
492	488	808	807	809	487	517	521	777	778	776	522	535	539	759	760	758	540
493	803	496	495	800	804	516	782	513	514	785	781	534	764	531	532	767	763
798	503	501	796	500	793	787	506	508	789	509	792	769	524	526	771	527	774
612	686	687	610	689	607	613	683	682	615	680	618	631	665	664	633	662	636
691	605	693	694	602	606	678	620	676	675	623	619	660	638	658	657	641	637
697	698	598	597	599	702	672	671	627	628	626	667	654	653	645	646	644	649
600	596	700	699	701	595	625	629	669	670	668	630	643	647	651	652	650	648
601	695	604	603	692	696	624	674	621	622	677	673	642	656	639	640	659	655
690	611	609	688	608	685	679	614	616	681	617	684	661	632	634	663	635	666

Fig. 4, Second Part. (6^4:S=3891)

given in *Magic Squares and Cubes* and simply extend it to cover the larger numbers involved we shall have a group of four cubes in which all the "straight" dimensions have S=514, but no diagonals except the four cubic diagonals. Each horizontal row of squares will produce a cube having exactly the same properties as those in the four vertical rows. If the four squares in either diag-

I					III										
1	4095	4094	4	5	4091	4090	8	4032	66	67	4029	4028	70	71	4025
4088	10	11	4085	4084	14	15	4081	73	4023	4022	76	77	4019	4018	80
4080	18	19	4077	4076	22	23	4073	81	4015	4014	84	85	4011	4010	88
25	4071	4070	28	29	4067	4066	32	4008	90	91	4005	4004	94	95	4001
4065	31	30	4068	4069	27	26	4072	96	4002	4003	93	92	4006	4007	89
24	4074	4075	21	20	4078	4079	17	4009	87	86	4012	4013	83	82	4016
16	4082	4083	13	12	4086	4087	9	4017	79	78	4020	4021	75	74	4024
4089	7	6	4092	4093	3	2	4096	72	4026	4027	69	68	4030	4031	65
4064	34	35	4061	4060	38	39	4057	97	3999	3998	100	101	3995	3994	104
41	4055	4054	44	45	4051	4050	48	3992	106	107	3989	3988	110	111	3985
49	4047	4046	52	53	4043	4042	56	3984	114	115	3981	3980	118	119	3977
4040	58	59	4037	4036	62	63	4033	121	3975	3974	124	125	3971	3970	128
64	4034	4035	61	60	4038	4039	57	3969	127	126	3972	3973	123	122	3976
4041	55	54	4044	4045	51	50	4048	120	3978	3979	117	116	3982	3983	113
4049	47	46	4052	4053	43	42	4056	112	3986	3987	109	108	3990	3991	105
40	4058	4059	37	36	4062	4063	33	3993	103	102	3996	3997	99	98	4000
II					IV										

Fig. 5, 8^4, First Part (One cube written).

onal of the figure be piled together neither vertical columns nor cubic diagonals will have the correct summation, but all the diagonals of vertical squares in either direction will. Regarding the whole group of sixteen squares as a plane square we find it magic, having the summation 2056 in every rank, file and corner diagonal, 1028

in each half-rank or half-file, and 514 in each quarter-rank or quarter-file. Furthermore all complementary pairs are balanced about the center.

The alternative arrangement shown in Fig. 3 makes each of the small squares perfect in itself, with every rank, file and corner diagonal footing up 514 and complementary pairs balanced about the

V								VII							
3968	130	131	3965	3964	134	135	3961	193	3903	3902	196	197	3899	3898	200
137	3959	3958	140	141	3955	3954	144	3896	202	203	3893	3892	206	207	3889
145	3951	3950	148	149	3947	3946	152	3888	210	211	3885	3884	214	215	3881
3944	154	155	3941	3940	158	159	3937	217	3879	3878	220	221	3875	3874	224
160	3938	3939	157	156	3942	3943	153	3873	223	222	3876	3877	219	218	3880
3945	151	150	3948	3949	147	146	3952	216	3882	3883	213	212	3886	3887	209
3953	143	142	3956	3957	139	138	3960	208	3890	3891	205	204	3894	3895	201
136	3962	3963	133	132	3966	3967	129	3897	199	198	3900	3901	195	194	3904
161	3935	3934	164	165	3931	3930	168	3872	226	227	3869	3868	230	231	3865
3928	170	171	3925	3924	174	175	3921	233	3863	3862	236	237	3859	3858	240
3920	178	179	3917	3916	182	183	3913	241	3855	3854	244	245	3851	3850	248
185	3911	3910	188	189	3907	3906	192	3848	250	251	3845	3844	254	255	3841
3905	191	190	3908	3909	187	186	3912	256	3842	3843	253	252	3846	3847	249
184	3914	3915	181	180	3918	3919	177	3849	247	246	3852	3853	243	242	3856
176	3922	3923	173	172	3926	3927	169	3857	239	238	3860	3861	235	234	3864
3929	167	166	3932	3933	163	162	3936	232	3866	3867	229	228	3870	3871	225
VI								VIII							

Fig. 5, 8^4, Second Part (One cube written).

center. As in the other arrangement the squares in each vertical or horizontal row combine to make cubes whose "straight" dimensions all have the right summation. In addition the new form has the two plane diagonals of each original square (eight for each cube), but sacrifices the four cubic diagonals in each cube. In lieu

perfect in that it has the summation 16388 for rank, file and corner diagonal (also for broken diagonals if each of the separated parts contain two, four or six—not an odd number of cells), and in balancing complementary couplets. When the eight squares are piled one upon the other a cube results in which rank, file, column, the plane diagonals of each horizontal square, the four ordinary cubic diagonals and 32 cubic bent diagonals all have S=16388. What is still more remarkable, the *half* of each of the "straight" dimensions and of each cubic diagonal has half that sum. Indeed this cube of eight can be sliced into eight cubes of 4 in each of which every rank, file, column and cubic diagonal has the footing 8194; and each of these 4-cubes can be subdivided into eight tiny 2-cubes in each of which the eight numbers foot up 16388.

So much for the features of the single cube here presented. As a matter of fact only the one cube has actually been written out. The plan of its construction, however, is so simple and the relations of numbers so uniform in the powers of 8 that it was easy to investigate the properties of the whole 8^4 scheme without having the squares actually before me. I give here the initial number of each of the eight squares in each of the eight cubes, leaving it for some one possessed of more leisure to write them all out and verify my statements as to the intercubical features. It should be remembered that in each square the number diagonally opposite the one here given is its complement, i. e., the number which added to it will give the sum 4097.

I	II	III	IV	V	VI	VII	VIII
1	3840	3584	769	3072	1281	1537	2304
4064	289	545	3296	1057	2784	2528	1825
4032	321	577	3264	1089	2752	2496	1857
97	3744	3488	865	2976	1377	1633	2208
3968	385	641	3200	1153	2688	2432	1921
161	3680	3424	929	2912	1441	1697	2144
193	3648	3392	961	2880	1473	1729	2112
3872	481	737	3104	1249	2592	2336	2017
16388	16388	16388	16388	16388	16388	16388	16388

Each of the sixty-four numbers given above will be at the upper left-hand corner of a square and its complement at the lower right-hand corner. The footings given are for these initial numbers,

but the arrangement of numbers in the squares is such that the footing will be the same for every one of the sixty-four columns in each cube. If the numbers in each horizontal line of the table above be added they will be found to have the same sum: consequently the squares headed by them must make a cube as nearly perfect as the example given in Fig. 5, which is cube I of the table above. But the sum of half the numbers in each line is half of 16388, and hence each of the eight cubes formed by taking the squares in the horizontal rows is capable of subdivision into 4-cubes and 2-cubes, like our original cube. We thus have sixteen cubes, each with the characteristics described for the one presented in Fig. 5.

If we pile the squares lying in the diagonal of our great square (starting with 1, 289, etc., or 2304, 2528, etc.) we find that its columns and cubic diagonals are not correct; but all the diagonals of its vertical squares are so, and even here the remarkable feature of the half-dimension persists.

Of course there is nothing to prevent one's going still further and examining constructions involving the fifth or even higher powers, but the utility of such research may well be doubted. The purpose of this article is to suggest in sketch rather than to discuss exhaustively an interesting field of study for some one who may have time to develop it.

H. M. KINGERY.

WABASH COLLEGE.

In Memory of
Edward C. Hegeler

MR. Edward C. Hegeler of La Salle, Illinois, the founder of *The Open Court* and president of the Open Court Publishing Company, passed away peacefully after a short illness on Saturday, June 4, at eight o'clock in the evening.

Imposing in his appearance, venerable in his full snow-white hair and beard, and commanding respect with the serious expression of his broad-browed face, he was like one of the ancient patriarchs, wont to lead and to be obeyed. Being descended from an East Frisian family, he was a typical Teuton, tall and hardy, blue eyed and frank, manly and absolutely reliable in word and deed. He was a man incapable of telling a lie, and none who knew him would ever have believed that he could break a promise or shirk a duty.

He was born September 13, 1835, in the old Hansa town, Bremen, Germany, and he was proud of the Republican institutions of his native city.

It had been the wish of Mr. Hegeler's father, Hermann Dietrich Hegeler of Bremen, originally of Oldenburg, to have one of his sons settle in the United States, a country in which he himself had traveled and in the development of which he took a great interest. He was anxious to have his family represented here in this country and take an active part in its destinies. For this purpose he selected his youngest son Edward, who was educated with this end in view. It was thus but natural that Mr. Hegeler imbibed an American patriotism from his earliest childhood, but it would be wrong to think that his American patriotism ever antagonized his love of Germany, of the German people, customs and traditions, and their many noble aspirations in the arts and sciences. On the contrary,

he wanted to carry the German spirit into the new world on a soil favorable to its further growth. He wanted to transplant the seeds of German culture into his new home, and he was always ready to do his best to preserve friendly relations and mutual respect between the two nations.

Mr. Hegeler attended school in the Academy at Schnepfenthal. He then studied mechanical engineering at the Polytechnic Institute at Hanover, 1851-53, and in the school of mines at Freiberg, Saxony, 1853-56, here mainly under Prof. Julius Weisbach.

Accompanied by his friend and fellow student at Freiberg, Mr. F. W. Matthiessen, Mr. Hegeler traveled for some months on the Continent and in England, whence they embarked for America and landed in Boston in March 1857. While looking over the country for a proper place to settle they learned of Friedensville, Pennsylvania, where a zinc factory had been built, but it stood idle because the owners had not been able to manufacture the zinc. Mr. Matthiessen and Mr. Hegeler, then 21 and 22 years old, stepped in and with the same furnace succeeded in producing spelter, which at that time was pioneer work in America, for hitherto this metal had been imported from Europe. On account of the financial stringency of 1856, which still persisted in 1857, the owners of the Friedensville works refused to put more money into the enterprise, while neither Mr. Hegeler nor Mr. Matthiessen felt justified in risking their own capital, mainly because they had no confidence in the mines, which actually gave out eight years later.

Having further on investigated conditions in Pittsburg and Johnsville, Pa., and also in southeastern Missouri, Mr. Hegeler and Mr. Matthiessen finally decided upon La Salle, Illinois, because its coal fields were nearest to the ore supply at Mineral Point, Wisconsin. Here they started the Matthiessen and Hegeler Zinc Works on a small scale, on the same spot on which the present large plant is still operated.

Mr. Hegeler returned in 1860 to Germany, where on April 5 he married Camilla Weisbach, the daughter of his admired teacher. In July of the same year the young couple settled in La Salle, where with few interruptions they lived until the end of their lives. Mrs.

Hegeler died only two years ago, May 28, 1908. Ten children were born to them, of whom seven survive, two sons and five daughters; and there are twenty-three grandchildren.

Mr. Hegeler's religion was simple enough, but like many simple things it is not easy for every one to understand. His ancestors had belonged to the Reformed Church, and the intellectual atmosphere of his father's house which surrounded him in his childhood was liberal. In Schnepfenthal he came in contact with the pietistic traditions of that institution, and he was deeply impressed with its devotional spirit, especially as it found utterance in song. When further experience in life broadened him, he surrendered his belief in Christian dogmatism but he preserved that seriousness of purpose, that moral endeavor, that profound faithfulness which characterizes all true religion. He had found the necessary correctives in the monistic conception of science. His idea of God had changed, but his "Religion of Science" would not dispense with God. With Goethe he saw God in nature, and recognized him as that power which enforces a definite kind of conduct. Morality is not what we think is good, but what can stand the test in the furnace of thorough and continued experience; it is for us to decipher the handwriting of God.

There was no need to look for a heaven in the clouds; the promises of providence fulfil all the expectations we can have here on earth. Every new discovery reveals new glories, and in this sense Mr. Hegeler remembered an old Moravian hymn expressing the sentiments of the passage in 1 Corinthians ii. 9:

"Eye hath not seen nor ear heard, neither have entered into the heart of man the things which God hath prepared for them that love him."

"Was noch kein Auge sah,
Was noch kein Ohr vernahm,
Was je hienieden
Kein Menschenherz empfand,
Das hat Gott denen
Mit Huld beschieden,
Die bis an's Ende
Getreu ihn lieben."

Mr. Hegeler took great interest in psychology and found the key to its problems in the proposition, "I am my ideas." He argued that a man is wherever his ideas are. Our ancestors survive in us, and we shall survive wherever future generations think our thoughts and act as we would have acted. He deemed it the highest duty of every man to work out his own immortality. In his own conception, though he has ceased to be with us in the flesh, he has not passed from us. He is with us in spirit, and his soul remains a potent presence so long as his work, his thoughts, his ideals will persist.

For the sake of presenting his solution of the religious problem, the foundation of religion and ethics on a strictly scientific basis, Mr. Hegeler founded and endowed The Open Court Publishing Company, which has published *The Open Court* since February 17, 1887, and *The Monist* since October 1, 1890; the former in the first year as a fortnightly, then as a weekly, and since 1897 as a monthly periodical, illustrated and popular in style; the latter a quarterly serving the same purpose, but open also to a more rigorous scientific treatment of religio-philosophical questions.

In the light of a scientific interpretation of the main doctrines of religion, Mr. Hegeler began thus to find a deep meaning in the old dogmas, and his sympathies were not limited to the faith of his childhood but to all religions, of which each in its own way more or less clearly expresses the same truths and preaches the same ethics. He counted among his friends not only some of the greatest scientists of the age, men like Ernst Mach and Ewald Hering, George J. Romanes, Hugo De Vries and the late Oxford scholar F. Max Müller, but also Buddhists and Catholic priests, Protestants and Freethinkers. With all the definiteness of his convictions he was broad in his sympathies, and to sum up we may without exaggeration say of him:

"He was a man, take him for all in all,
I shall not look upon his like again."

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MATHEMATICAL CREATION.[1]

THE genesis of mathematical creation is a problem which should intensely interest the psychologist. It is the activity in which the human mind seems to take least from the outside world, in which it acts or seems to act only of itself and on itself, so that in studying the procedure of geometric thought we may hope to reach what is most essential in man's mind.

This has long been appreciated, and some time back the journal called *L'enseignement mathématique,* edited by Laisant and Fehr, began an investigation of the mental habits and methods of work of different mathematicians. I had finished the main outlines of this article when the results of that inquiry were published, so I have hardly been able to utilize them and shall confine myself to saying that the majority of witnesses confirm my conclusions; I do not say all, for when the appeal is to universal suffrage unanimity is not to be hoped.

A first fact should surprise us, or rather would surprise us if we were not so used to it. How does it happen there are people who do not understand mathematics? If mathematics invokes only the rules of logic, such as are accepted by all normal minds; if its evidence is based on principles common to all men, and that none could deny without

[1] Translated from the French by George Bruce Halsted.

being mad, how does it come about that so many persons are here refractory?

That not every one can invent is nowise mysterious. That not every one can retain a demonstration once learned may also pass. But that not every one can understand mathematical reasoning when explained appears very surprising when we think of it. And yet those who can follow this reasoning only with difficulty are in the majority: that is undeniable, and will surely not be gainsaid by the experience of secondary school teachers.

And further: how is error possible in mathematics? A sane mind should not be guilty of a logical fallacy, and yet there are very fine minds who do not trip in brief reasoning such as occurs in the ordinary doings of life, and who are incapable of following or repeating without error the mathematical demonstrations which are longer, but which after all are only an accumulation of brief reasonings wholly analogous to those they make so easily. Need we add that mathematicians themselves are not infallible?

The answer seems to me evident. Imagine a long series of syllogisms, and that the conclusions of the first serve as premises of the following: we shall be able to catch each of these syllogisms, and it is not in passing from premises to conclusion that we are in danger of deceiving ourselves. But between the moment in which we first meet a proposition as conclusion of one syllogism, and that in which we reencounter it as premise of another syllogism occasionally some time will elapse, several links of the chain will have unrolled; so it may happen that we have forgotten it, or worse, that we have forgotten its meaning. So it may happen that we replace it by a slightly different proposition, or that, while retaining the same enunciation, we attribute to it a slightly different meaning, and thus it is that we are exposed to error.

Often the mathematician uses a rule. Naturally he

begins by demonstrating this rule; and at the time when this proof is fresh in his memory he understands perfectly its meaning and its bearing, and he is in no danger of changing it. But subsequently he trusts his memory and afterwards only applies it in a mechanical way; and then if his memory fails him, he may apply it all wrong. Thus it is, to take a simple example, that we sometimes make slips in calculation because we have forgotten our multiplication table.

According to this, the special aptitude for mathematics would be due only to a very sure memory or to a prodigious force of attention. It would be a power like that of the whist player who remembers the cards played; or, to go up a step, like that of the chess-player who can visualize a great number of combinations and hold them in his memory. Every good mathematician ought to be a good chess-player, and inversely; likewise he should be a good computer. Of course that sometimes happens; thus Gauss was at the same time a geometer of genius and a very precocious and accurate computer.

But there are exceptions, or rather I err, I cannot call them exceptions without the exceptions being more than the rule. Gauss it is, on the contrary, who was an exception. As for myself, I must confess, I am absolutely incapable even of adding without mistakes. In the same way I should be but a poor chess-player; I would perceive that by a certain play I should expose myself to a certain danger; I would pass in review several other plays rejecting them for other reasons, and then finally I should make the move first examined, having meantime forgotten the danger I had foreseen.

In a word, my memory is not bad, but it would be insufficient to make me a good chess-player. Why then does it not fail me in a difficult piece of mathematical reasoning where most chess-players would lose themselves?

Evidently because it is guided by the general march of the reasoning. A mathematical demonstration is not a simple juxtaposition of syllogisms, it is syllogisms *placed in a certain order,* and the order in which these elements are placed is much more important than the elements themselves. If I have the feeling, the intuition, so to speak, of this order, so as to perceive at a glance the reasoning as a whole, I need no longer fear lest I forget one of the elements, for each of them will take its allotted place in the array, and that without any effort of memory on my part.

It seems to me then, in repeating a reasoning learned, that I could have invented it. This is often only an illusion; but even then, even if I am not so gifted as to create it by myself, I myself re-invent it in so far as I repeat it.

We know that this feeling, this intuition of mathematical order, that makes us divine hidden harmonies and relations, cannot be possessed by every one. Some will not have either this delicate feeling so difficult to define, or a strength of memory and attention beyond the ordinary, and then they will be absolutely incapable of understanding higher mathematics. Such are the majority. Others will have this feeling only in a slight degree, but they will be gifted with an uncommon memory and a great power of attention. They will learn by heart the details one after another; they can understand mathematics and sometimes make applications, but they cannot create. Others, finally, will possess in a less or greater degree the special intuition referred to, and then not only can they understand mathematics even if their memory is nothing extraordinary, but they may become creators and try to invent with more or less success according as this intuition is more or less developed in them.

In fact what is mathematical creation? It does not consist in making new combinations with mathematical entities already known. Any one could do that, but the com-

binations so made would be infinite in number and most of them absolutely without interest. To create consists precisely in not making useless combinations and in making those which are useful and which are only a small minority. Invention is discernment, choice.

How to make this choice I have before explained; the mathematical facts worthy of being studied are those which, by their analogy with other facts, are capable of leading us to the knowledge of a mathematical law just as experimental facts lead us to the knowledge of a physical law. They are those which reveal to us unsuspected kinship between other facts, long known, but wrongly believed to be strangers to one another.

Among chosen combinations the most fertile will often be those formed of elements drawn from domains which are far apart. Not that I mean as sufficing for invention the bringing together of objects as disparate as possible; most combinations so formed would be entirely sterile. But certain among them, very rare, are the most fruitful of all.

To invent, I have said, is to choose; but the word is perhaps not wholly exact. It makes one think of a purchaser before whom are displayed a large number of samples, and who examines them, one after the other to make a choice. Here the samples would be so numerous that a whole lifetime would not suffice to examine them. This is not the actual state of things. The sterile combinations do not even present themselves to the mind of the inventor. Never in the field of his consciousness do combinations appear that are not really useful, except some that he rejects but which have to some extent the characteristics of useful combinations. All goes on as if the inventor were an examiner for the second degree who would only have to question the candidates who had passed a previous examination.

But what I have hitherto said is what may be observed

or inferred in reading the writings of the geometers, reading reflectively.

It is time to penetrate deeper and to see what goes on in the very soul of the mathematician. For this. I believe, I can do best by recalling memories of my own. But I shall limit myself to telling how I wrote my first memoir on Fuchsian functions. I beg the reader's pardon; I am about to use some technical expressions, but they need not frighten him, for he is not obliged to understand them. I shall say, for example, that I have found the demonstration of such a theorem under such circumstances. This theorem will have a barbarous name, unfamiliar to many, but that is unimportant; what is of interest for the psychologist is not the theorem but the circumstances.

For fifteen days I strove to prove that there could not be any functions like those I have since called Fuchsian functions. I was then very ignorant; every day I seated myself at my work table, stayed an hour or two, tried a great number of combinations and reached no result. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class of Fuchsian functions, those which come from the hypergeometric series; I had only to write out the results, which took but a few hours.

Then I wanted to represent these functions by the quotient of two series; this idea was perfectly conscious and deliberate, the analogy with elliptic functions guided me. I asked myself what properties these series must have if they existed, and I succeeded without difficulty in forming the series I have called theta-Fuchsian.

Just at this time I left Caen, where I was then living, to go on a geologic excursion under the auspices of the School of Mines. The changes of travel made me forget

my mathematical work. Having reached Coutances we entered an omnibus to go some place or other. At the moment when I put my foot on the step the idea came to me without anything in my former thoughts seeming to have paved the way for it, that the transformations I had used to define the Fuchsian functions were identical with those of non-Euclidean geometry. I did not verify the idea; I should not have had time, as, upon taking my seat in the omnibus, I went on with a conversation already commenced, but I felt a perfect certainty. On my return to Caen, for conscience' sake I verified the result at my leisure.

Then I turned my attention to the study of some arithmetical questions apparently without much success and without a suspicion of any connection with my preceding researches. Disgusted with my failure, I went to spend a few days at the seaside, and thought of something else. One morning, walking on the bluff, the idea came to me, with just the same characteristics of brevity, suddenness, and immediate certainty, that the arithmetic transformations of indeterminate ternary quadratic forms were identical with those of non-Euclidean geometry.

Returned to Caen, I meditated on this result and deduced the consequences. The example of quadratic forms showed me that there were Fuchsian groups other than those corresponding to the hypergeometric series; I saw that I could apply to them the theory of theta-Fuchsian series and that consequently there existed Fuchsian functions other than those from the hypergeometric series, the only ones I then knew. Naturally I set myself to form all these functions. I made a systematic attack upon them and carried all the outworks, one after another. There was one however that still held out, whose fall would involve that of the whole place. But all my efforts only served

at first the better to show me the difficulty, which indeed was something. All this work was perfectly conscious.

Thereupon I left for Mont-Valérien where I was to go through my military service; so I was very differently occupied. One day, going along the street, the solution of the difficulty which had stopped me, suddenly appeared to me. I did not try to go deep into it immediately, and only after my service did I again take up the question. I had all the elements and had only to arrange them and put them together. So I wrote out my final memoir at a single stroke and without difficulty.

I shall limit myself to this single example; it is useless to multiply them. In regard to my other researches I would have to say analogous things, and the observations of other mathematicians given in *L'enseignement mathématique* would only confirm them.

Most striking at first is this appearance of sudden illumination, a manifest sign of long, unconscious prior work. The rôle of this unconscious work in mathematical invention appears to me incontestable, and traces of it would be found in other cases where it is less evident. Often when one works at a hard question, nothing good is accomplished at the first attack. Then one takes a rest, longer or shorter, and sits down anew to the work. During the first half-hour, as before, nothing is found, and then all of a sudden the decisive idea presents itself to the mind. It might be said that the conscious work has been more fruitful because it has been interrupted and the rest has given back to the mind its force and freshness. But it is more probable that this rest has been filled out with unconscious work and that the result of this work has afterward revealed itself to the geometer just as in the cases I have cited; only the revelation instead of coming during a walk or a journey, has happened during a period of conscious work, but independently of this work which plays

at most a rôle of excitant, as if it were the goad stimulating the results already reached during rest, but remaining unconscious, to assume the conscious form.

There is another remark to be made about the conditions of this unconscious work: it is possible, and of a certainty it is only fruitful, if it is on the one hand preceded and on the other hand followed by a period of conscious work. These sudden inspirations (and the examples already cited sufficiently prove this) never happen except after some days of voluntary effort which has appeared absolutely fruitless and whence nothing good seems to have come, where the way taken seems totally astray. These efforts then have not been as sterile as one thinks; they have set agoing the unconscious machine, and without them it would not have moved and would have produced nothing.

The need for the second period of conscious work, after the inspiration, is still easier to understand. It is necessary to put in shape the results of this inspiration, to deduce from them the immediate consequences, to arrange them, to word the demonstrations, but above all is verification necessary. I have spoken of the feeling of absolute certitude accompanying the inspiration; in the cases cited this feeling was no deceiver, nor is it usually. But do not think this a rule without exception; often this feeling deceives us without being any the less vivid, and we only find it out when we seek to put on foot the demonstration. I have especially noticed this fact in regard to ideas coming to me in the morning or evening in bed while in a semi-hypnagogic state.

Such are the realities; now for the thoughts they force upon us. The unconscious, or, as we say, the subliminal self plays an important rôle in mathematical creation; this follows from what we have said. But usually the subliminal self is considered as purely automatic. Now we

have seen that mathematical work is not simply mechanical, that it could not be done by a machine however perfect. It is not merely a question of applying rules, of making the most combinations possible according to certain fixed laws. The combinations so obtained would be exceedingly numerous, useless, and cumbersome. The true work of the inventor consists in choosing among these combinations so as to eliminate the useless ones or rather to avoid the trouble of making them, and the rules which must guide this choice are extremely fine and delicate. It is almost impossible to state them precisely; they are felt rather than formulated. Under these conditions, how imagine a sieve capable of applying them mechanically?

A first hypothesis now presents itself: the subliminal self is in no way inferior to the conscious self; it is not purely automatic; it is capable of discernment; it has tact, delicacy; it knows how to choose, to divine. What do I say? It knows better how to divine than the conscious self, since it succeeds where that has failed. In a word, is not the subliminal self superior to the conscious self? You recognize the full importance of this question. Boutroux, in a recent lecture, has shown how it came up on a very different occasion, and what consequences would follow an affirmative answer. (See also, by the same author, *Science et Religion*, pp. 313 ff.)

Is this affirmative answer forced upon us by the facts I have just given? I confess that, for my part, I should hate to accept it. Reexamine the facts then and see if they are not compatible with another explanation.

It is certain that the combinations which present themselves to the mind in a sort of sudden illumination, after an unconscious working somewhat prolonged, are generally useful and fertile combinations, which seem the result of a first impression. Does it follow that the subliminal self, having divined by a delicate intuition that

these combinations would be useful, has formed only these, or has it rather formed many others which were lacking in interest and have remained unconscious?

In this second way of looking at it, all the combinations would be formed in consequence of the automatism of the subliminal self, but only the interesting ones would break into the domain of consciousness. And this is still very mysterious. What is the cause that, among the thousand products of our unconscious activity, some are called to pass the threshold, while others remain below? Is it a simple chance which confers this privilege? Evidently not; among all the stimuli of our senses, for example, only the most intense fix our attention, unless it has been drawn to them by other causes. More generally, the privileged unconscious phenomena, those susceptible of becoming conscious, are those which, directly or indirectly, affect most profoundly our emotional sensibility.

It may be surprising to see emotional sensibility invoked *à propos* of mathematical demonstrations which, it would seem, can interest only the intellect. This would be to forget the feeling of mathematical beauty, of the harmony of numbers and forms, of geometric elegance. This is a true esthetic feeling that all real mathematicians know, and surely it belongs to emotional sensibility.

Now, what are the mathematic entities to which we attribute this character of beauty and elegance, and which are capable of developing in us a sort of esthetic emotion? They are those whose elements are harmoniously disposed so that the mind without effort can embrace their totality while realizing the details. This harmony is at once a satisfaction of our esthetic needs and an aid to the mind, sustaining and guiding. And at the same time, in putting under our eyes a well-ordered whole, it makes us foresee a mathematical law. Now, as we have said above, the only mathematical facts worthy of fixing our attention and

capable of being useful, are those which can teach us a mathematical law. So that we reach the following conclusion: The useful combinations are precisely the most beautiful, I mean those best able to charm this special sensibility that all mathematicians know, but of which the profane are so ignorant as often to be tempted to smile at it.

What happens then? Among the great numbers of combinations blindly formed by the subliminal self, almost all are without interest and without utility; but just for that reason they are also without effect upon the esthetic sensibility. Consciousness will never know them; only certain ones are harmonious, and consequently, at once useful and beautiful. They will be capable of touching this special sensibility of the geometer, of which I have just spoken, and which, once aroused, will call our attention to them, and thus give them occasion to become conscious.

This is only a hypothesis, and yet here is an observation which may confirm it: when a sudden illumination seizes upon the mind of the mathematician, it usually happens that it does not deceive him, but it also sometimes happens, as I have said, that it does not stand the test of verification; well, we almost always notice that this false idea, had it been true, would have gratified our natural feeling for mathematical elegance.

Thus it is this special esthetic sensibility, which plays the rôle of the delicate sieve of which I spoke, and that sufficiently explains why the one lacking it will never be a real creator.

Yet all the difficulties have not disappeared. The conscious self is narrowly limited, and as for the subliminal self we know not its limitations, and this is why we are not too reluctant in supposing that it has been able in a short time to make more different combinations than the whole life of a conscious being could encompass. Yet these limitations exist. Is it likely that it is able to form

all the possible combinations, whose number would frighten the imagination? Nevertheless that would seem necessary, because if it produces only a small part of these combinations, and if it makes them at random, there would be small chance that the *good,* the one we should choose, would be found among them.

Perhaps we ought to seek the explanation in that preliminary period of conscious work which always precedes all fruitful unconscious labor. Permit me a rough comparison. Figure the future elements of our combinations as something like the hooked atoms of Epicurus. During the complete repose of the mind, these atoms are motionless, they are, so to speak, hooked to the wall; so this complete rest may be indefinitely prolonged without the atoms meeting, and consequently without any combination between them.

On the other hand, during a period of apparent rest and unconscious work, certain of them are detached from the wall and put in motion. They flash in every direction through the space (I was about to say the room) where they are enclosed, as would, for example, a swarm of gnats or, if you prefer a more learned comparison, like the molecules of gas in the kinematic theory of gases. Then their mutual impacts may produce new combinations.

What is the rôle of the preliminary conscious work? It is evidently to mobilize certain of these atoms, to unhook them from the wall and put them in swing. We think we have done no good, because we have moved these elements a thousand different ways in seeking to assemble them and have found no satisfactory aggregate. But, after this shaking up imposed upon them by our will, these atoms do not return to their primitive rest. They freely continue their dance.

Now, our will did not choose them at random; it pursued a perfectly determined aim. The mobilized atoms are

therefore not any atoms whatsoever; they are those from which we might reasonably expect the desired solution. Then the mobilized atoms undergo impacts which make them enter into combination among themselves or with other atoms at rest which they struck against in their course. Again, I beg pardon, my comparison is very rough, but I scarcely know how otherwise to make my thought understood.

However it may be, the only combinations that have a chance of forming are those where at least one of the elements is one of those atoms freely chosen by our will. Now, it is evidently among these that is found what I called the *good combination.* Perhaps this is a way of lessening the paradoxical in the original hypothesis.

Another observation. It never happens that the unconscious work gives us the result of a somewhat long calculation *all made,* where we have only to apply fixed rules. We might think the wholly automatic subliminal self particularly apt for this sort of work, which is in a way exclusively mechanical. It seems that thinking in the evening upon the factors of a multiplication, we might hope to find the product ready made upon our awakening, or again that an algebraic calculation, for example a verification, would be made unconsciously. Nothing of the sort, as observation proves. All one may hope from these inspirations, fruits of unconscious work, is a point of departure for such calculations. As for the calculations themselves, they must be made in the second period of conscious work, that which follows the inspiration, that in which one verifies the results of this inspiration, and deduces their consequences. The rules of these calculations are strict and complicated. They require discipline, attention, will, and therefore consciousness. In the subliminal self, on the contrary, reigns what I should call liberty, if we might give this name to the simple absence of discipline

and to the disorder born of chance. Only, this disorder itself permits unexpected combinations.

I shall make a last remark: when above I made certain personal observations, I spoke of a night of excitement when I worked in spite of myself. Such cases are frequent, and it is not necessary that the abnormal cerebral activity be caused by a physical excitant as in that I mentioned. It seems in such cases, that one is present at his own unconscious work, made partially perceptible to the over-excited consciousness, yet without having changed its nature. Then we vaguely comprehend what distinguishes the two mechanisms or, if you wish, the working methods of the two egos. And the psychologic observations I have been able thus to make seem to me to confirm in their general outlines the views I have given.

Surely they have need of it, for they are and remain in spite of all very hypothetical: the interest of the question is so great that I do not repent of having submitted them to the reader.

HENRI POINCARÉ.

PARIS, FRANCE.

A CONTRIBUTION TO THE HISTORY OF THE WORD PERSON.

A POSTHUMOUS TREATISE BY ADOLF TRENDELENBURG.*

INTRODUCTION BY RUDOLF EUCKEN.

Trendelenburg's busy life in a great city and his many avocations prevented the completing of several large works he had planned. Had he been able to finish the Ethics and Psychology upon which he was engaged, our comprehension of his scientific method would have been enriched by many important touches. But a strict injunction not to publish any unfinished work made it impossible to fill up the gaps from his posthumous writings.

A paper was found, however, that could not be considered unfinished, and the author would certainly have published it himself in a collection of minor articles, had he found an opportunity for such a compilation. It is an essay dated January 20, 1870, entitled "A Contribution to the History of the Word Person."

This work, to be sure, is now exactly forty years old, but in spite of its small compass it may be regarded as a valuable expression of the individuality of this thinker and investigator, whose life-work retains its significance notwithstanding the fact that time has opened other paths since then. Here Trendelenburg's friendly relation to history, his eagerness to bring historical periods into close relationship and to let present conditions develop as much as possible from the past, are clearly shown in this treatise. One is equally impressed by the artistic charm of his presentation with its simple grace, as well as by the breadth of view, the balanced interest, the thought and care bestowed upon the work.

Trendelenburg's close attachment to the old philosophy did not permit him a near relationship to Kant, nor even a full appreciation of the revolutionary service Kant had performed. That he prized him very highly, nevertheless, is fully evident from this brief essay, for its whole trend of development is toward Kant, as its goal. Here we may see how Trendelenburg was prepared so very effectively by his historical labors in most diverse fields to deepen the concept of personality. In this way the whole leads up to the chief ethical concepts of Kant.

I.

KANT has redefined the concept of person in its relation to morals. A good part of his ethical doctrine is contained in the sentence, "Man is a person." As an

* Translated from the German by Carl H. Haessler.—This essay, written in 1870, was not published until 1908, when it appeared as a posthumous paper in the *Kant-Studien*. We wish to thank Prof. Rudolf Eucken, of Jena, who

antithesis to the concept of thing, Kant says in his *Grundlegung der Metaphysik der Sitten*[1] (1785) [Foundation of Metaphysical Ethics], "Rational beings are called persons because their nature distinguishes them as an end unto themselves; that is, as something that may not be used simply as a means, and consequently in so far limits all caprice and is an object of esteem." Since the rational nature exists as an end unto itself and not simply as a means to be utilized at the pleasure of this or that will, the practical commandment, says Kant, should read as follows: "So act that, in your own person as well as in the person of every one else, you always employ human nature never simply as a means but always at the same time as an end." "Man is, to be sure, sufficiently unholy," says Kant elsewhere,[2] "but human nature in his person must be holy to him. In the whole creation everything one wishes and which is under one's control can be employed simply as a means; man alone, and with him every rational creature, is an end unto himself."

If man as a rational being is a person, and as such an end unto himself, it follows that conforming to a rational end he is capable of a rational decision, and this is the essence of his freedom.

Kant therefore attributes freedom and end unto oneself to person, and in this personality that arouses esteem he sees the sublimity of human nature.

One of Kant's good services is that he has newly illuminated the worth of man (all things have value, a market price, but man alone has worth). This concept and that of esteem for man, who is in this sense a person, went hand in hand and together achieved growing recognition. This

edited the manuscript, and Prof. Hans Vaihinger of Halle, the editor of *Kant-Studien*, for their kind permission to publish both the essay of Professor Trendelenburg and their own comments made in this connection. Professor Eucken's introduction has been slightly modified to suit the presnt occasion. Ed.

[1] Page 56.

[2] *Krit. der pr. Vernunft* (1788), p. 155.

the word, explaining *persona* as *per se una* [one in or of itself].

The latest derivation I have seen gives a still deeper meaning. Since *ona* in Latin words signifies fullness (which may be true, as in *annona* [the yearly yield], *Pomona* [the goddess of orchards], *Bellona* [the goddess of war]), then *persona,* that is *per se ona* means fullness in or of itself, just as the person of Christ is regarded as the *pleroma,* the fullness or fulfilment.

In his academic treatise of 1858[3] Jacob Grimm is not indisposed to classify *persona* in the group of masculine name-words represented by feminine nouns. He accepts the derivation from *personare* in so far as the change of quantity, which also occurs elsewhere, does not disturb him; but he explains the sense in a different way. The meaning does not come from a mask that heightens the sound of the voice, but *persona* might in itself indicate the speaker who gives sound to his speech, in the same way that *vocula,* used as an epithet, signifies one speaking softly, although in itself it is nothing but *parva vox* [little voice]. This etymology is very circuitous and hardly agrees with the customary usage of *personare.*

In our perplexity we are almost driven to another derivation suggested by Forcellini.[d] If the mask came from Greece to Rome along with the theater, it is possible that the word *prosopon*‡ [face] or *prosopeion*** [mask], as a foreign word, underwent a violent transformation, somewhat as the foreign plant name *hyoskyamos*†† became *iusquiamus* [henbane, an herb] and the analogy becomes

[3] *Denkschriften,* 1858, *Ueber die Vertretung männlicher durch weibliche Namensformen* [On the Representation of Masculine Substantives by Feminines], p. 49.

[d] 1688-1768. An Italian philologist.

‡ πρόσωπον.

** προσωπεῖον.

†† ὑοσκύαμος.

closer when we assume (with Schwencke)[c] that *prosopon* or *prosopeion* was transformed into *persona,* so that *persona* might stand for *prosopina* by the reverse of the process through which *Persephone* became *Proserpina* [queen of the lower world].

In this wealth of doubtful and uncertain conjectures, we may see that the family relationship of *persona* has not yet been discovered. Accordingly we shall return to the meaning which alone concerns our present purpose.

III.

In Luther's translation of the Bible, the word "person" has several meanings. In telling the story of a betrayal, Luther translates 2 Macc. xii. 4: *Sie ersäuften sie alle an die zweihundert Person*‡‡ [They drowned them all to the number of two hundred persons]. He renders Luke xix. 3, where Zacchaeus had climbed a mulberry tree in his desire to see Jesus: *Denn er war klein von Person* [Because he was small in person]. In the first passage, the Greek text and the Vulgate have only the numeral, and Luther, it seems, selected "persons" to include both men and women. In the second passage, the Greek describes Zacchaeus as *helikiai michros,** the Latin says, *quia statura pusillus erat.* In the usage, *Er war klein von Person,* the outer appearance is an essential idea, as is the case with the mask, but it is here regarded as the appearance of the whole body.

Other constructions are more germane to our subject. Even in the Old Testament recurs the expression, *ohne Ansehen der Person* [without respect of person]. In Deut. x. 17, we read: "God, a mighty and a terrible, which regardeth not persons, nor taketh reward;" in 2 Chron. xix.

* 1853-.... A German philologist.

‡‡ Hirschberg's edition has: ersäufeten sie sie alle, in die zweihundert Personen.

* ἡλικίᾳ μικρός.

7: "For there is no iniquity with the Lord our God, nor respect of persons"; Job. xxxiv. 19, "That accepteth not the persons of princes." The Hebrew expression has more meaning. "To accept the countenance," *basha' panim.*† can only mean to accept another's look, that is, to be well disposed toward him. When the Septuagint renders this phrase *thaumasai prosopon*‡ (2 Chron. xix. 7; cf. Deut. x. 17 and Job xxxiv. 19), it is a question whether "to admire a countenance" should be understood literally or whether the usage of *prosopon* had already assumed the conception we find it to have in Polybius for instance, namely, the conception of the rôle one plays in life. The Vulgate translates Deut. x. 17: *Deus qui personam non accipit* [God that accepteth not the person]; 2 Chron. xix. 7, *personarum acceptio* [acceptance of persons]; Job xxxiv. 19, "*qui non accipit personas principum*" [that accepteth not the persons of princes]. *Prosopon,* which does not yet signify the person before the court in Attic Greek, has become *persona* in the legal sense in this translation, and hence Luther's *ohne Ansehen der Person.* The *accipere personam* [to accept the person] explains itself in such terms as *persona accepta* and *persona grata.*

In *prosopon* as a mask, is always implied the carrying out of a rôle, the assuming of a character. New Testament expressions, reminding one of those just quoted from the Old Testament, are in still closer accord with this meaning. In Acts x. 34, 35, after the conversion of the Roman centurion Cornelius, Peter exclaims: "Of a truth I perceive that God is no respecter of persons: But in every nation he that feareth him, and worketh righteousness is accepted with him." Similarly, in Rom. ii. 10, 11, the apostle Paul writes, "Glory, honor, and peace, to every man that worketh good, to the Jew first, and also to the

† פָּנִים נָשָׂא

‡θαυμάσαι πρόσωπον.

Gentile: For there is no respect of persons with God." (Cf. also Gal. ii. 6). The Greek expressions are,

οὔκ ἐστι προσωπολήπτης ὁ θεός (Acts x. 34);

προσωποληψία (Rom. ii. 11);

πρόσωπον ὁ θεὸς ἀνθρώπου οὐ λαμβάνει (Gal. ii. 6), which corresponds to the rendering of Lev. xix. 15, in the Septuagint:

οὐ λήψῃ πρόσωπον πτωχοῦ οὐδὲ μὴ θαυμάσῃς πρόσωπον δυνάστου.

[Thou shalt not respect the person of the poor, nor honor the person of the mighty.]

The Vulgate translates by *personarum acceptio* (Acts x. 34; Rom. ii. 11) and *Deus personam hominis non accipit* (Gal. ii. 6). Whereas the legal usage of person is clearly apparent in this Latin translation, the Greek *prosopon* still has the particular conception in mind as represented by the mask, the sense being that in Christendom no respect for the person, that is for racial features, Jewish or Greek, circumcised or uncircumcised, would obtain.

In the expression, "without respect of person," there enters into the language the notion of a privilege to which some persons lay claim on some particular ground (for instance, superiority of race) as against the universal. In Latin, this conception of the particular is easily recognized when, for example, Cicero says in a letter to Pompey (*ad. Att.*, VIII, 11D) on the connection between the party which he had joined and the rôle he had played:

Ut mea persona semper ad improborum civium impetus aliquid videretur habere populare.

[So that my rôle seemed always to have something in it, inviting the attacks of the wicked.]

IV.

The conception of *persona* as a part played becomes still more probable when we see *prosopon* become *persona*

in the ethical sense among the Stoics whose concern in life was harmony with oneself, and consistent character. The Stoics are fond of comparisons and carry them even into their doctrines.

Thus we read in the brief ethics of Epictetus (*Encheiridion*, ch. 17):

> Consider that you are the interpreter (ὑποκριτής) of a rôle whose character is determined by the Master (διδάσκαλος); if he wants a short rôle, short it is; if long, long; if he wants you to portray a poor man, see to it that you play the poor man with spirit; in the same manner when your part is that of a lame man, of a magistrate, or of an ordinary man. For to play well the assigned rôle (πρόσωπον) is your business, but to choose the rôle, the business of another.

In the same sense, chapter 37 has it:

> If you take upon yourself a rôle beyond your power, you will play it poorly and awkwardly, and neglect another which you might have filled acceptably.

In his Dissertations Epictetus bids us, in the same sense, to learn the rôle assigned or assumed, to know what we wish to be, and not to forget our particular rôle. In the Dissertations I, 2, 12, we read:

> When Florus asked Agrippinus for advice as to whether he should go to Nero's spectacle and accept a position there, Agrippinus answered, "Go ahead"; and when Florus inquired further why he did not go himself, Agrippinus replied, "I would not consider it for a moment, for whoever once looks upon such things, who examines into and estimates the value of externals, is not greatly unlike those who have forgotten their own rôles."

So, according to Stoic doctrine (Diog. Laert. VIII, § 160) the wise man will be like a good histrionic artist, *hypokrites*.**

These thoughts are not peculiar to the doctrine of Epictetus, the Stoic of Nero's time, but belong to the oldest of the Greek Stoics. At any rate we have a fragment of

** ὑποκριτής.

Teles, probably a contemporary of Chrysippus,[f] similar in tone to the sayings of Epictetus, with this difference, that Tyche (Fortune) and not God in his providence composes the parts. The use of *persona* in this ethical sense of an assigned or assumed rôle is familiar to Cicero, for example in *De officiis,* I, 28 and 31.

In this interpretation we can easily recognize the essential feature of Stoic ethics. The well written rôle is in accordance with nature, as demanded by the first proposition of the Stoics, to live in accordance with nature; that is, to follow the dictates of reason which is the fundamental element of nature. The well written part, furthermore, particularizes the universal in accordance with the nature peculiar to each individual and grounds it in a rational mean.

In this way the aim of the Stoics is realized. The universal law of nature works in agreement with the individual will. For everything is as it should be and the course of life is beautiful when the will of the universal disposer and the *daemon*[g] of the individual are in harmony. Inasmuch as the rôle is subordinated to the drama as a whole, but has its being nevertheless in the particular part, it is an artistic way of stating the Stoic doctrine. Moreover, the well written part is true to itself like the *vita sibi concors* [life consistent with itself] to which Seneca directs us. Accordingly, the wise man, who ought to resemble a good histrionic artist, must not only write the part himself but must also interpret it.

We have here, it is true, an ethical significance for *persona,* of characteristic stamp, but not the significance that expresses, as in our day, the essential principle of individual morality. In the German we still find traces of *persona* as mask or rôle; for example in the connection,

[f] Died 208 B. C., a Stoic philosopher of great ingenuity in verbal subtleties.

[g] In Greek thought, the spirit attending a man from birth to death. Cf. Roman *genius.*

er hat seine Person gut gespielt, gut vorgestellt [He played or portrayed his part well].

V.

The same term, *agit personam* [he plays a part] said of an actor on the stage, is a legal expression, when *agere apud iudicem* [to plead before the court], *actio* [suit] is used of the complaint. The plaintiff (*actor*) and the defendant, in plea and counter-plea, resemble the masks, the persons, on the stage. Different rôles in this play are assigned, as it were, to the plaintiff, the defendant and the judge. And so when the word *persona* became a legal term it had a correspondingly definite and physical meaning. Accordingly, *persona* is a favorite expression for plaintiff and defendant; as for instance in the *Institutiones* of Gaius,[h] IV, § 86:

> Qui autem alieno nomine agit intentionem quidem ex persona domini sumit, condemnationem autem in suam personam convertit.
>
> [But he who pleads in another's name, (as a *cognitor* [attorney] or *procurator* [agent]) takes the accusation indeed from the person of his employer, but turns the condemnation on himself.]

In this way, it appears, *persona* became a strictly legal term.

Persona, then, indicates those who bear characteristic legal relations which are to be distinguished, as in the example of *persona domini, persona procuratoris.* Just as *persona* in its proper meaning of mask points to a particular or individual feature which has developed in the universal human physiognomy, so also the same term indicates, among the rhetoricians for instance, the relation to be distinguished between individuals:

> Ut Hector ad Priamum persona filii est, ad Astyanactem persona

[h] A. D. 110-180. The most famous authority on Roman Law. His *Institutiones* was a favorite hand-book of law, and forms the foundation of Justinian's "Institutes."

patris, ad Andromachen persona mariti, ad Paridem persona fratris, ad Sarpedonem amici, ad Achillem inimici.

[Thus Hector stands to Priam in the relation of son, to Astyanax of father, to Andromache of husband, to Paris of brother, to Sarpedon of friend, to Achilles of enemy.]

The relations enumerated here with *persona,* especially those of kinship, might almost all become particular legal relations. As a rule one individual bears but one relation in one and the same legal matter, but it may happen that he bears several at the same time; for example, when a consul emancipates his son, the *persona patris* [paternal relation] and the *persona magistratus* [magisterial relation] by virtue of which he performs the ceremony are borne by the same man. Hence the expression:

Unus homo, plures personas sustinet.

[One man sustains several rôles.]

Cicero, *De orator.,* II, 102, says:

Tres personas unus solus sustineo summa animi aequitate, meam, adversarii, iudicis.

[Three rôles do I sustain with the greatest equanimity, my own, that of my opponent, that of the judge.]

We can see that *persona* still has much of the original meaning and that *persona* and *homo* are not yet synonymous. In a related sense the term *persona* can be applied even to a thing, as an inheritance, as having legal relations; cf. Ulpian[1] in the title, *De dominio acquirendo* XLI, I, 34, *hereditas non heredis personam sed defuncti sustinet* [On acquiring right of ownership XLI, 1, 34, the inheritance sustains the person not of the heir but of the deceased], which is expressed in the Institutes, II, 14, 2, thus:

....Nondum enim adita hereditas personae vicem sustinet non heredis futuris sed defuncti.

[For an inheritance not yet entered upon, sustains the place of the person of the deceased, not of the future heir.]

[1] A. D. 170-228. Next to Papinianus the most famous Roman jurist.

Roman law goes a step further in the usage of the word *persona*. Inasmuch as strictly speaking only human beings and not things can have rights, the result was, that in legal terminology *persona* designated the rights of human beings without distinction. We read for instance in the Institutes of Gaius, 1, § 8:

> Omne autem ius quo utimur vel ad personas pertinet vel ad res vel ad actiones.
>
> [However, every right of which we treat pertains to persons or to things or to lawsuits.]

And further, § 9:

> Et quidem summa divisio de iure personarum haec est, quod omnes homines aut liberi sunt aut servi.
>
> [And indeed the highest division of persons in law is this, that all men are either freemen or slaves.]

Freemen and slaves, otherwise opposed to each other in legal relations, are all termed *personae* here. *Personae* stand opposed to *res,* persons in contradistinction to things. In this significance *persona,* proceeding from the differential particulars of human relations, is stripped of all particularity and fades into the conception of man in general.

From this source springs, even if indirectly, the German usage of person that we find in Luther's translation of the Bible, 2 Macc. xii. 4, "*Sie ersäuften sie alle in die* 200 *Person.*" The Latin expresses "no one" by the negative with *homo, ne* + *homo* = *nemo*; the French has it *il n'y a personne.* So indefinite has the definitive word *persona,* "mask," become. In this direction we have come to be far removed from Kant's pregnant proposition, "Man is a person"; for with this meaning the proposition would be the reverse of pregnant, it would be tautological. Ay, in this particular the usage has sunk even below the noble meaning of man, for we ask slightingly, "What does this person want?" (*Was will die Person?*)

VI.

Perhaps one other scientific application of the word had its part in this process of generalization.

When the Greeks, probably the Stoics who were the founders of our modern grammar, gave the name *prosopon*, countenance or mask, to the significant inflectional ending that we call the "person" of the verb, they undoubtedly had the drama in view where persons really move as "I" and "you."

This relation which has been lost in the technical expression clearly appears again in a related instance in Lucian (*De calumn.* c. 6):

τριῶν δ'ὄντων προσώπων, καθάπερ ἐν ταῖς κωμῳδίαις, τοῦ διαβάλλοντος καὶ τοῦ διαβαλλομένου καὶ τοῦ πρὸς ὃν ἡ διαβολὴ γίνεται.

[There being three persons just as in the comedies, the slanderer, the one slandered, and the one who hears the slander.]

The mask with which the conversation opens, usually the first in order of appearance, is called the first; the one adressed, the second. Generally speaking, every conversation has its inception in the fact that one of two persons thinks of or desires something, and either imparts his thought or states his desire to the other. It was proper to call that person the first person, in whom rests the impulse and likewise the initiative of the whole conversation.

On this we support a psychological meaning in which the "I" is called the first person because to every one the "I" is first and closest. Or we may defend an idealistic significance in accordance with which the "I" is designated as the first person because it spontaneously and creatively brings forth the concept of everything that is "not-I."

If it is probable that the term *prosopon* for the first and second person arose from the dialogue in the manner indicated above, then the one of whom they were talking

was differentiated from the first and second persons automatically, as it were; and if he entered into the action he was naturally called the third mask. And indeed the designation of a thing is also put in the third person, either because with reference to a thing the verb is expressed in the third person, or because a pronoun like "it" is referred to a thing. But it is not hard to explain. When, as in the third person, the conversation is of a personal subject (he, she), then this becomes of its own accord a kind of object with reference to the "I" and "you," and in this respect there is a certain relationship between the "he" as person and the "he" as thing, whenever a noun is used in the masculine gender as in the Continental languages; both are objects. And *vice versa* language sometimes represents things as being alive, especially in those languages in which masculine and feminine genders are assigned to words, and thereby a thing is approximately treated as a person.

The grammatical term *prosopon* as personal ending is found as early as in Aristarchus[j] (under Ptolemy Philometor) and from this it is not unlikely that *prosopon* as person in grammar goes back to the birthplace of our modern grammar, the Stoic school, which also applied *prosopon,* the mask, in an ethical sense. The pupil of Aristarchus was Dionysius Thrax,[k] and the Greek grammar which has been preserved under his name appears really to come from him, even if only in an extract.[4] It defines the *prosopa* [persons], thus:

πρῶτον μὲν, ἀφ' οὗ ὁ λόγος, δεύτερον δὲ, πρὸς ὃν ὁ λόγος, τρίτον δὲ, περὶ οὗ ὁ λόγος.

[The first, by whom the word; the second, to whom the word; the third, of whom the word (is spoken).]

[j] About 156 B. C. Famous grammarian and critic of antiquity.

[k] About 80 B. C. His book Τέχνη Γραμματική became the basis for all succeeding grammars.

[4] Joannes Classen, *De grammaticae Graecae primordiis,* 1829, pp. 18 f., 99.

We have followed this simple explanation.[5]

M. Terentius Varro[1] who was Cicero's senior by ten years, is familiar with the grammatical usage of *persona* translated from *prosopon*; with Cicero begins the legal usage of *persona* which attributes to it the rôle of bearing a particular legal relation. Varro, for instance, has it:

> Quom ita personarum natura triplex esset, qui loqueretur, ad quem, de quo.
>
> [Since, then, the character of the persons is threefold, he who speaks, is spoken to, is spoken of.]

It is then possible that the grammatical and legal usages of *persona* helped each other along in the course of the generalization in which finally *persona* and *homo* became synonymous.

VII.

It is a fact in the history of the term "person" that an entire church council was held to investigate and determine its meaning. This happened at Alexandria in the year 362 in the time of Julian the Apostate. The question at issue was the orthodox conception of the Trinity.

The Greek church distinguished Father, Son and Holy Ghost as three *hypostases*†† of such a character that the one divine essence (*ousia, physis**) pervades all three *hypostases*. It had raised this doctrine into the Nicene symbolism under Constantine. The Latin fathers, however, saw in this expression *hypostasis, hyphistamenon,*† *subsistens*, an inadequate term that set up three self-sufficing

[5] Schömann indicates the relation to the stage in his essay, *Die Lehre von den Redeteilen nach den Alten*, 1862, p. 87; cf. also on πρόσωπα Classen I, 1, p. 82; Steinthal, *Geschichte der Sprachwissenschaft bei den Griechen und Römern mit besonderer Rücksicht auf die Logik*, pp. 624; 652 f.

[1] B. C. 116-28. Known as the "most learned of the Romans," as he was the most voluminous.

†† ὑποστάσεις.

* οὐσία, φύσις. The latter term means "nature."

†ὑπόστασις, ὑφιστάμενον.

essences and lost sight of the one divine substance above them. For them God was only one hypostasis.

The Greek fathers feared that such a conception would precipitate them into the Sabellian heresy, a doctrine that regarded Father, Son and Holy Ghost as merely different manifestations of the supreme entity which revealed itself in the creation and history of the world, as a triad. In the Roman church Tertullian had, indeed, written in opposition to the monarchist Praxeas who wanted to make the distinction of Father, Son and Holy Ghost not real but ideal, but Tertullian proposed at the same time to distinguish the three:

> Personae, non substantiae nomine, ad distinctionem non ad divisionem.[6]
>
> [By the name of person, not of substance, for the purpose of distinguishing not of separating them.]

And so the result was that the bishops of the Roman church would not accept the expression *hypostasis* and those of the Greek church refused the expression *prosopon, persona.* In that council, bishops from Italy, Arabia, Egypt and Lybia met with Athanasius, archbishop of Alexandria. Recognizing each other as orthodox in the mat-

[6] Tertullian, *adv. Praxeam* c. 12: "Qui si ipse Deus est, secundum Joannem, Deus erat sermo, habes duos, alium dicentem, ut fiat, alium facientem. Alium autem quomodo accipere debeas iam professus sum, personae, non substantiae, nomine, ad distinctionem, non ad divisionem. Ceterum unique teneam unam substantiam in tribus cohaerentibus, tamen alium dicam oportet ex necessitate sensus eum qui iubet et eum qui facit."

[If he is really God, according to John (i. 1) the *Word was God,* you have two, one saying that it should be performed, the other performing it. But how you ought to accept the other I have already set forth; by the name of person not of substance, to distinguish not to separate them. On the other hand, although I hold that there is one substance in three closely connected forms, nevertheless I shall say there ought to be another, from the necessities of the meaning, one who orders and one who performs.]

Augustine, *De trinitate,* VII, 7: ..."dictum est a nostris Graecis una essentia, tres substantiae; a Latinis autem una essentia vel substantia, tres personae, quia sicut iam diximus non aliter in sermone nostro id est Latino essentia quam substantia solet intelligi."

[It has been said by our Greek friends that there is one essence and three substances; by the Latins, however, one essence or substance and three persons, because just as we said, in our tongue, that is, in Latin, *essentia* is usually understood no differently than *substantia.*]

ter, they declared the controversy over *hypostasis* and *persona* as a quibbling about words.

After that, the word *persona*, or *prosopon*, became synonymous with *hypostasis* and *idioma*‡ [character] and legitimate in the Christian church. Gregory Nazianzen[m] (died 390) says, for instance, in one of his sermons (*Oratio* 39, p. 630):

> A threefold light flashes upon us at the mention of God, threefold with respect to his peculiar characteristics (ἰδιώματα), hypostases, or rather persons, one might say; but one-fold on the contrary when we regard the substance, that is, the godhead.

In this way they came to a verbal agreement but in so doing really concealed the differences concerning a subject not clearly understood.

In the meantime, the characteristic meaning of the word *persona* came once more to the surface. Servetus[n] used it in his essay *De trinitatis erroribus* [On the Mistakes in (the Doctrine of) the Trinity], 1532. He declared the three persons in the godhead were three functions in the same sense as three rôles and because of this original meaning of *persona* he died the death of a heretic at the stake on Calvin's accusation (1553). That the controversy raged around this first definition of *persona* is clear, among other things, from Melanchthon's *Loci* [Points]. We read there (ed. 1559, Berlin, 1856, p. 6):

> Lusit homo fanaticus Servetus de vocabulo Personae et disputat olim Latinis significasse habitum aut officii distinctionem, ut dicimus. Roscium alias sustinere personam Achillis, alias sustinere personam Ulissis, seu alia est persona consulis, alia servi, ut Cicero inquit: magnum est in republica tueri personam principis. Et hanc veterem signficationem vocabuli sycophantice detorquet ad articulum de tribus personis divinitatis.
>
> [A fanatical fellow named Servetus has played with the word

‡ ἴδιωμα.

[m] About A. D. 325-390. A learned orthodox ecclesiastical writer.

[n] 1511-1553. He was a physician as well as a polemicist.

"person" and denies that the old Latin meaning was habit or the distinction of office, as we say. Roscius sustained now the person (rôle) of Achilles, now that of Ulysses; or the person of the consul is one thing, that of a slave another, as Cicero says: It is important in a republic to protect the person of the chief executive. And this old meaning of the substantive he underhandedly distorts to his statement on the three persons of divinity.]

The ecclesiastical elucidation which Melanchthon also gives, runs otherwise:

Persona est substantia individua intelligens incommunicabilis non sustentata in alia natura.

[Person is a rational individual substance, incommunicable, not sustained in another nature.]

Thus in theology, *persona*, denoting the mask of the stage, gains the meaning of an individual, intransmissible (incommunicable), rational essence which is self-existent.

In this sense the Augsburg Confession of 1530 declares:

Und wird durch das Wort *persona* verstanden, nit ein Stück, nit eygenschafft in einem andern, sondern es selbig bestadt.

[And by the word *persona* is understood not a part, not a quality (rooted) in another, but that it exists in itself.]

The word *persönlich* (personal) in this meaning had already passed into German through such mystics as Meister Eckhart.° In God, power, wisdom and love (benevolence) are seen in person and essence, and with this God man should unite himself. This idea, since Abelard and still in Leibnitz's *Systema theologicum* was the foundation of the three persons of the trinity.

Ach, lieber Mensch, was schadet es dir, dass du Gott vergönnest, dass er in dir Gott sei? (Meister Eckhart, ed. Pfeiffer, p. 66, 36).

[Ah, my good man, how will it hurt thee to concede to God that he exists as God in thee?]

Wenn sich Gott dem Menschen giebt, ist die erste Gabe die Minne, in der er alle Gabe giebt, die Minne er selber personlich und wesentlich (p. 328, 10).

° 1250-1327. The first great speculative mystic.

[When God gives himself to man the first gift is love, in which he gives every gift,—love, which he gives in person and essence.]

Inasmuch as man possesses God, continues Meister Eckhart, (p. 245, 13) he has power, wisdom and benevolence in person; he has their properties, all three in one essence. By this admixture is the essential in this power, wisdom and benevolence defined. Theology borders close on ethics here; it is not a far cry to say that whoever receives and possesses God's power, wisdom and benevolence, all three in person in one essence, becomes himself thereby "personal" or "a person."

VIII.

Once more we return to the legal usage to gain from it also an ethical significance. We saw that in Roman law *persona* meant man in general and that it included both freemen and slaves, as for instance in the expression *ius personarum.* This meaning gradually disappears and only the freeman is termed a person.

It is frequently declared that a slave has no right, for instance *Dig.* IV, 5, 4 (*De capite minutis* [On the loss of civil rights]) *servile caput nullum ius habet, ideo nec minui potest* [A slave has no rights and therefore cannot be deprived of them], and concerning the day of manumission it says: *hodie incipit statum habere* [On this day he begins to have civil standing] (*ib.*). The point is raised, that in the eyes of the law, slaves are on a level with the four-footed animals: *servis nostris exaequat quadrupedes* [Our slaves are on a level with the quadrupeds], *ad legem Aquiliam,* IX, 2, 2, § 2; *Quod attinet ad ius civile, servi pro nullis habentur* [With respect to civil rights, slaves are regarded as nobodies] (*De regulis juris*) L, 17, 32; *Nulla cadit obligatio* [No obligation is incurred]; (*In personam servilem*) L, 17, 22; and in a legal sense: *servitutem*

mortalitati fere comparamus [We might almost compare slavery with death] (*De regulis iuris*) L, 17, 209.

Since under this conception a slave is legally disqualified, he is also eliminated from the category of persons (*Nov. Theodos.*, c. 17); *servos quasi nec personam habentes* [Slaves (are regarded) as having no person].

In Justinian's time the doctrine obtained that slaves were not persons; for Theophilus, the Greek translator of the Institutes, says a slave is *aprosopos*,** a term already defined (*Theophilus ad* § 2 *Inst. de hered., instit., et princ. Inst. de stipulatione servorum. Inst.* III, 18) for which a corresponding Latin expression, such as *impersonalis*, did not arise.

Savigny[p] observes that this theory developed comparatively late.[r] Since Justinian it has been established that the legally qualified man is a person and none other. The slave is a thing. *Persona est homo statu civili praeditus* [A person is a man possessed of civil standing] and freedom is exclusively an attribute of a person. Should we inquire further what is freedom, Roman law explains it as the natural power to do what you please unless you are prevented by force or by law. (*Inst.* I, 3, 1.)

In this concept of person there is implied more than in the previous conceptions of the word which Kant made use of to express the ethical idea of man. If what is merely a means by which, is called a thing, then a being that is a rational end unto itself and may never be merely a means must be a "person."

In his letter to Wagner (*De vi activa corporis, de anima et de anima brutorum* [On the Active Bodily Energy, on the Soul and the Soul of Animals], 1710, ed. Erdm., p. 467) Leibnitz applied the legal concept of person to the deeper

** ἀπρόσωπος; i. e., un-personal.

[p] 1779-1861. A celebrated writer and professor of Roman law.

[r] Savigny, *System des heutigen römischen Rechts*, Vol. II, 1840, p. 32, n.

characterization of what is human. He considers that consciousness of self and capacity for communion with God are privileges of the human soul, and thinks that when once it has participated in this communion it will never relinquish the person of a citizen in the commonwealth of God (*Sentio nunquam eas deponere personam civis in republica Dei*). The right of a person to citizenship in the commonwealth of God appears in this connection as the special dignity (*Würde*) of mankind.

IX.

A psychological concept of personality naturally precedes the ethical idea of personality that we sought in the origin of the name. This concept represents the power of man to be conscious himself of his identity in the various states of his existence (*Einleitung zu den metaphysischen Anfangsgründen der Rechtslehre*, p. xxii). Without this faculty of continuous self-consciousness there could be no morality, that is to say, no accountability. Even before Kant had put deeper ethical significance into the word person and had in this way defined the idea of human nature, Leibnitz, and after him Christian Wolff,[q] had associated the word person with the conception of a self-consciousness identical with itself in the passage of time.

In the above mentioned letter to Wagner (*loc. cit.*, p. 466) Leibnitz had designated self-consciousness and recollection of a former state as attributes that elevated man above the beast, and this superiority he termed *personae conservatio* [preservation of person]:

Itaque non tantum vitam et animam, ut bruta, sed et conscientiam sui et memoriam pristini status, et, ut verbo dicam, personam servat.

[Therefore not so much life and soul in common with the beast, but both consciousness of self and recollection of a former state, and, if I may use the expression, his person, does he preserve.]

[q] 1679-1754. He methodized and systematized Leibnitz's philosophy.

On this word Chr. Wolff in his *Vernünftige Gedanken von Gott, der Welt, und der Seele des Menschen* [Rational Thoughts on God, the World and the Soul of Man], 1725, § 924, remarks:

> Since we designate as person, a thing that is conscious of having been the same thing previously in this or that state, animals are not persons. On the other hand since human beings are conscious of having been the same previously in this or that state, they are persons.

In the same sense Jacobi,[r] for instance, opposing the doctrine of blind dumb necessity that he detected in the teaching of Spinoza, claimed that there was a personal God, and that we mortals derive little satisfaction out of an impersonal cosmic reason as the ultimate idea on which to rest.

When man became distinguished from the animal by the concept of person with the notion of self-consciousness pervading human existence, it easily happened that the distinguishing ethical essence, the idea of human nature, was transferred to the same word.

Thus we see the word person applied in various sciences. Although on the one hand it has been generalized in common usage, on the other the sciences attach a deep significance to it. They keep the word elevated and finally make it possible to have the stamp of a fundamental ethical concept impressed upon it.

We can see from the word "personality" and its parallel "individuality," which also has its history, that they have not developed among the masses. But such words coined by science have great value for the commonalty if they become current and are true to their significant content, for they may become standards in public judgment

[r] 1743-1819. A philosophical writer of the intuitionist school and Goethe's friend.

and even volitional impulses. Consequently, it is the duty of writers not to wear down and dull the definition.

* * *

BIBLIOGRAPHICAL COMMENTS BY DR. HANS VAIHINGER.*

The exceedingly attractive essay found among Trendelenburg's posthumous papers, and printed as the leading article of this number is supplemented and well substantiated by various publications of recent date.

In the first place, concerning the remarkable previous history of the term *persona,* Dr. Siegmund Schlossmann, professor of law at Kiel, has recently published *Persona und πρόσωπον im Recht und im christlichen Dogma*[1] [*Persona* and πρόσωπον in Law and in Christian Dogma].

The author starts out from the legal concept of person, citing much literature of great importance, with the express purpose of ridding the legal conceptual system of this "nuisance," since the concept is vague and indefinite. We must content ourselves with a mere mention of this learned work in which classical philology, archeology, church history, and jurisprudence have a rendezvous.

In the second place we should like to draw attention to a treatise which chance brought to our notice, by Professor Dr. Sawicki of Pelplin (in West Prussia near Danzig), *Das Problem der Persönlichkeit bei Kant* [The Problem of Personality with Kant], in *Der Katholik.*[2] The author uses as a starting point the thesis of D. Greiner[3] on *Der Begriff der Persönlichkeit bei Kant,* of which a review by the present writer appeared in the first volume of the *Kant-Studien,* p. 439.

The character of Sawicki's treatise is of course readily determined from the fact that the work appeared in a *Zeitschrift für katholische Wissenschaft und kirchliches Leben* [Journal of Catholic Science and Church Life], edited by two professors in the episcopal seminary of Mentz. Nevertheless it gives evidence of gratifying objectivity, is decorous and reasonable in tone, and is praiseworthy testimony to the fact that the war against Kant can be waged even on the conservative side in a spirit that need by no means be as

* An editorial in *Kant-Studien,* XIII, 1 and 2, pp. 194 ff.

[1] Kiel and Leipsic, Lipsius and Tischer, 1906, pp. 128.

[2] 87. Jahrg., Mentz, Kirchheim & Co., 1907, pp. 44-66.

[3] In *Archiv f. Gesch. d. Phil.,* X, 1896.

bitter as that of Willmann. Sawicki's essay is, furthermore, a noteworthy commentary on the treatise of Dr. Bauch in *Kant-Studien*, XIII, 1 and 2, p. 32, entitled *Kant in neuer ultramontan- und liberal-katholischer Beleuchtung* [Kant in the Light of the Newer Ultramontanism and Liberal Catholicism].

Among other things Sawicki says: "The concept of personality has privileges of long standing in the domain of philosophy. But the ancient world contented itself with the metaphysical concept; its application to ethics is the work of modern times. The development of the concept is to be regarded as most happy, because the concept of ethical personality suitably designates a moral ideal that is at the same time eminently Christian."

Here Sawicki refers to his essay, *Ernst und Würde der Persönlichkeit im Christentum*[4] [The Gravity and Dignity of Personality in Christianity].

"The employment of this concept in an ethical significance goes back in its essentials to Kant. He did not simply introduce the concept but also worked it out and defined it. All subsequent achievements in this field have at least their germ in his work."

Sawicki cites Höffding's fine saying:

"Apart from the forced derivation, Kant first enunciated a great and pregnant principle. It is the principle of personality in its noblest form, a thought that will live long after the fact of its establishment by Kant has been forgotten. It is a thought of great ethical importance not only in opposition to the principle of authority when this oversteps its purely educative province, but also in opposition to the doctrine of outward utility and success which is satisfied with the husks and forgets the kernel."

By the "metaphysical" concept of personality was meant, according to Sawicki, a rational self-conscious substance. Kant overthrew this metaphysics and warned expressly against the "paralogism" of personality. Thereby the concept of personality lost its power as the distinctive mark of substantiality, but Kant enriched the concept in its ethical application. However, one must distinguish in this ethical concept of personality between personality as basis, postulate or predisposition, and personality as the goal of the development and complete realization of ethical life.

[4] Cologne, 1906. In this connection may be recalled the pronounced efforts of liberal Protestantism in recent years for "personal Christianity," and also the leaflets published by Dr. Johannes Müller for personal life and the like. Personality, personal life, etc., have become commonplaces of late years in connection with the new romanticism.

In the first sense, Sawicki contends, transcendental freedom is *the* most intrinsic content of human personality, but merely as a foundation upon which to lay real moral greatness and not as moral greatness itself; for that is the end, not the beginning of development. In just this sense ought Kant's saying, that "Man is personality according to his calling," be understood. One ought also to distinguish in Kant's meaning between negative freedom, which is self-assertion against all nature, and positive freedom, or autonomy. Two other definitions that are related to this are that of personality in Kant's sense as end unto itself (*Selbstzweck*) and final aim (*Endzweck*) and personality as the realized idea of mankind.

"We gladly acknowledge that the essential points of the concept as they appear in Kant are justifiable and true.... It is a noble conception of the ethical problem of life to define it as the realization of the idea of mankind or as cultivation of the noblest possessions of the spirit, and this conception coincides with the truth when freedom is considered as the highest perfection of the spirit.

"A spirit strong and great in itself, free inwardly and outwardly, is Kant's picture of the moral spirit, and it is a true picture of moral personality. Equally accurate is the concept of end unto itself (*Selbstzweck*) used by Kant as the characteristic of personality....Man as a moral being is an end unto himself and must not be used as a mere means to the realization of an ulterior end;.... and this applies, as Kant justly emphasizes, even to God. If God has created man as a rational being, he has pledged himself to respect man's intrinsic worth and not to destine him for an irrational life-goal."

"Kant's regard for the social character of man also deserves full acquiescence....Finally, recognition is due Kant when he includes all men without distinction as possessing the dignity of personality....However, these merits in the ethics of Kant are offset by serious errors and weaknesses."

As examples Sawicki calls attention to the purely formal character of the moral law, its purely *a priori* character, its want of union with experience; and especially the want of distinction between personality and individuality, and the deficient recognition of the latter. Kant, he says, understood by personality the realization of the universal idea of mankind in each individual without distinction, but he failed to see the importance of particular differ-

ences between individuals, or of individuality in its distinctiveness and in its ethical significance which was later justly emphasized and exalted by Schleiermacher.

According to Sawicki, Kant's final error is his doctrine of complete autonomy, and this is natural because Sawicki holds that human morality is not purely autonomous but contains necessarily a heteronomous element of dependence on God as the highest source of moral law, and that religion alone, an inner relation with which Kant neither held nor taught, can make possible the highest perfection of personality.

In this connection I should like to call attention to another recent publication, one by Prof. Victor Delbos, *Maître de conférences* of the faculty of literature at the University of Paris. He has edited a new translation with introduction and notes of the *Grundlegung zur Metaphysik der Sitten,* under the title *Fondements de la métaphysique des mœurs.*[5] This entire work derives particular importance with regard to the meaning and range of Kant's ethical concept of person from the fact that in it Kant had formulated the concept for the first time. Accordingly the editor has very properly examined the concept in detail, and altogether he has done everything possible in his introduction to make the perusal of the work profitable and fruitful. The introduction consists of sections on the life and works of Kant; the moral concepts of Kant in the antecritical period; the morality of Kant in the period of philosophical criticism; the preparation for ethics by the criticism of speculative reason; its preparation by the philosophy of history, etc. The seventy pages of excellent introduction are followed by the translation with a running commentary in which the concept of person receives intelligent appreciation.

The concept of personality is also presented in an interesting manner in *Personalismus und Realismus,* by Hans Dreyer.[6] Here it is stripped of the dogmatic character that had continued to burden the "intelligible" character of Kant's concept. Personality becomes the idea of union between personal "faculties" and "qualities." This idea is then understood as a "task" in Kant's sense, and Dreyer says, "The task of man is, to become a personality" (*op. cit.,* pp. 71 f.).

Dreyer refers to the purely conceptual, not metaphysical, distinction between the three chief points, self-consciousness, individuality and character, distinguished by B. Bauch in the work *Glück-*

[5] Paris, Ch. Delagrave, Rue Soufflot 15.
[6] Berlin, Reuther & Reichard, 1905.

seligkeit und Persönlichkeit in der kritischen Ethik[1] [Happiness and Personality in Critical Ethics]. For Bauch also, character means the task of "making the individual qualities.... an antithesis to everything vague, unstable, uncertain and indefinite" since, through the self-conscious will, these qualities experience "a definitely fixed tendency toward oneness" (*op. cit.*, pp. 19 f).

Dreyer also calls attention to an expression of Goethe's that accords almost exactly with this conception. In the "intelligible" character of Kant two definitions lie side by side, of which one can be considered as a purely regulative principle or task, but the other, probably by means of the concept of the thing-in-itself, as a kind of metaphysical entity. Goethe has also conceived of character purely as a union of the qualities of personality. He observes, as Dreyer emphasizes, that the word character is employed "when a personality of notable qualities is persistent in habit, and will be turned aside therefrom by nothing whatsoever."

[1] Stuttgart, Frommann, 1902. In *Kant-Studien*, VIII, pp. 478 f., I have treated this noteworthy work at some length and need not enter into greater detail here. In the third chapter (on the place of personality in critical ethics) personality is elaborately and fittingly dealt with.

PERSON AND PERSONALITY.

WHAT we call personality constitutes the distinctive feature of a person, and a person is a human being with a concrete and definite individuality in contrast to lower creatures such as brute animals. Accordingly we understand by personality all the several features of a man's individual existence, including his bodily appearance, his habits and his character; and a man evinces his superiority over beasts not only by his rationality, his faculty of thinking, but also and mainly by his moral qualities, by responsibility. Personality therefore is prized highest among all the good things to be met in the field of our experience. We respect, or at least ought to respect, personality in others, and our own personality is a sacred trust which implies weighty and high duties.

The possessions which belong to man, his goods and chattels and bank account are external to him, they are his property, they are what he has, and holds and controls, but his personality is the man himself, and it is but natural that he wants to be just such a man as he is. Heredity, tradition and his own experience have shaped his character, and his character finds expression in his will. Therefore a man might like to change places with others, he might be glad to change fortunes, position in life, fame, family relations and even name, but he would be loath to change his personality. Everybody clings to his own self. This truth is expressed by Goethe in an epigram published in his *Westöstlicher Divan* (VIII) as follows:

"Volk und Knecht und Ueberwinder,
Sie gestehn zu jeder Zeit;
Höchstes Glück der Erdenkinder
Sei nur die Persönlichkeit.
Jedes Leben sei zu führen,
Wenn man sich nur nicht vermisst,
Alles könne man verlieren
Wenn man bliebe was man ist."

[Folks and slaves and he who conquers,
They confess howe'er it be,
Highest bliss for which man hankers
Is his personality.
Any life he rather chooseth
If himself he would not miss,
Anything he gladly loseth
If he stays just what he is.—Tr. by P. C.]

Schopenhauer[1] describes this habitual clinging to one's own personality more tersely in two lines, thus:

"Mir geht nun auf der Welt nichts über mich;
Denn Gott ist Gott, und ich bin ich."

[Naught can surpass me, replace or supply,
For God is God, and I am I.]

With a good deal of sarcasm the same idea echoes through the lines of Wilhelm Busch,[2] the famous German humorist, who says of the evil-doer:

"Auch hat er ein höchst verrucht Gelüst,
Grad' so zu sein wie er eben ist."

[The bad one maliciously listeth, you see,
Just such a one as he is, to be.]

[1] Schopenhauer puts this rhyme into the mouth of Thrasymachos, one of his disputants in a dialogue. See his *Panerga und Paralipomena*, Vol. II; *Kleine dialogische Schlussbelustigung* of the chapter *Zur Lehre von der Unzerstörbarkeit unseres wahren Wesens durch den Tod.*

[2] See the writer's translation of *Edward's Dream* by Wilhelm Busch (Chicago, Open Court Publishing Co., 1909).

From all this it becomes apparent what an important idea the concept personality is, and for this reason mystics have found here a wide field for their theories and for many vagaries.

The problem of personality is really the problem of man in his individual and particular idiosyncrasy, and modern psychology shows how personality, the very self of man, is a rich complex of many noble qualities, the quintessence of nature's work at its best, and the highest efflorescence of the evolution of life. It incorporates volitions, ideas, and aspirations systematized into a unit by self-consciousness.

Self-consciousness is a distinct prerogative of man. Lower creatures are sentient, the higher brute animals conscious, but man alone is self-conscious. He forms an idea of himself, and this idea of himself raises him above his bodily and temporary existence. It objectifies his own self and makes it possible that man can reflect upon himself and his own actions. He not only feels his own existence as do the higher animals, but he can say "I" and refers to himself as "me." He can speak of himself, he can compare himself with others, and he can judge himself. This makes it possible for him to wish to be different, and what Goethe says in his epigram is true enough of the average man, we might say of the natural man, but the higher man is not satisfied with his character, he aspires to some better mode of existence. He endeavors to grow better and to improve himself.

In the growth of evolution self-consciousness rises as a new factor which makes it possible for the pace of progress, of intellectual and moral advance, to be greatly accelerated. The wish to know more and to be better and nobler gradually hardens into a stern determination and finally overrules the lower instincts inherited from a less cultured past.

A man who tries to do the right thing whenever he is confronted with duties is called "responsible" and the very thought that conscious endeavor is expected of him strengthens his responsibility. In this way man forms an ideal of what he ought to do and what he ought to be; and under the guidance of this ideal he can by conscious concentration work out the nobler potentialities of his self.

The German poet Friedrich Rückert says:

"Vor Jedem steht ein Bild
Des, das er werden soll,
Und eh' er es nicht ist,
Wird nicht sein Friede voll."

[The type he ought to be
Each one bears in his mind,
Until that be attained
He never peace will find.—Tr. by P. C.]

Responsibility is the divine stamp of man, the stamp of his nobility and of his dignity. Responsibility presupposes that a person is not like a brute which blindly obeys its instincts, but that he can restrain himself; that he does not heedlessly rush into committing a deed, but that he can deliberate and choose. Thus he does not depend upon the present only, but can take into consideration the eventualities of the future. He can make his action an expression, not of the fleeting moment, but of his entire character; he may let the better, though more quiet motives have a chance to assert themselves against the lower impulses, even though these are louder and at times more vigorous. In a word responsibility presupposes free will guided by moral principles, which means that we expect a person to make his decisions with the good intention of doing the right thing.

Briefly stated we say: a person is a human being, which means, a rational creature, endowed with conscience and

capable of acting on his own free will so that he can be held responsible for his deeds. Accordingly there are these four indispensable features in a person, rationality, conscience, responsibility and free will.

* * *

Free will and determinism were formerly held to be irreconcilable, especially in the old theological disputations, but the difficulty is *de facto* a pseudo-problem.[8] It is based upon a confusion of the ideas of compulsion and determinedness. Freedom of will does not mean that the will is undetermined and indeterminable, a matter of haphazard chance like a throw of dice, but that it is *free to act according to its own nature.* An act of free will is the result neither of coercion nor of chance, but the necessary outcome of a free, that is to say an unhampered, decision, in which the determinant is the actor's own character.

He only can imagine that free actions in order to be truly free, are not, nor ought they be, determined by causation, who conceives of causation as a law in the sense of an enactment which enforces certain rules, as a government would enforce its decrees through the power of police forces. But like all uniformities of nature, causation is called a law only in an allegorical sense. The so-called "laws of nature" and "the law of causation" are descriptions of how things behave under given conditions, and therefore they had better be called "uniformities." If without being compelled by any one or any outside power, I act in such a way as to acknowledge the deed to be my own, it is called an act of my own free will, which being of a definite kind and following definite principles, will under given conditions result in definite actions.

The same is true of unconscious nature. The path of

[8] We have discussed it on former occasions in *Fundamental Problems*, pp. 191-196; *The Soul of Man*, pp. 389-397; *The Ethical Problem*, pp. 45-47, and *passim*.

a comet is determined according to the law of gravitation through its mass, which under definite conditions takes a definite course with a definite velocity. The nature of the comet is such as to behave in this way. The law of gravitation does not exercise the function of a cosmic police, it possesses no power and exercises no compulsion. It is merely a formula which describes the action of gravity. If a comet could speak it would declare that it pursues a certain direction because it wants to go there.

An act of free will is not an arbitrary deed which would form an exception to the law of cause and effect. An act of free will is as much determined by conditions as any other event, but the decisive factor in an act of free will is not any extraneous circumstance, but the character of the acting person. To state it briefly, we define "free will" as a will unimpeded by any compulsion.

An act of free will characterizes the person who performs it; it indicates what kind of a man he is. An act done under compulsion is foreign to the actor, and he can not be held accountable for it.

A person is expected to know that he has to stand by his deeds, and whenever he acts of his own free will he recognizes his deeds as his own, and thereby acquires the feeling of responsibility. A man in whom the feeling of responsibility is strong will be careful so to act as not to regret or repent his actions afterwards.

The good intention of doing the right thing develops naturally and automatically in such a social being as man; it is called "conscience," which in a word may be described as the moral instinct of man.

Personality does not originate in isolation; every person is a member of a social body, of a family, a tribe, of social conditions, of a nation, of mankind, and a feeling of interdependence among all members of a society is present in every one of them from the beginning. Even a pack of

wolves or dingos is animated in the chase by a common will, and this common will becomes a motive of action, which in human society assumes the authority of duty, of what a man ought to do in the interest of all. The common will of a community develops instinctively through the demands made on the members of a social group. These demands, if not spontaneously attended to, are enforced by a consensus which finds a different expression in different stages of social development. The assent which an individual more or less consciously gives to the justice of the common will gradually takes shape in what is called conscience.[4]

* * *

Man associates all the motives of actions which are an expression of his own character with the idea of his self and speaks of himself as "I" and "me." He says, "This concerns *me, I* do this, *I* will this, *I* love this, *I* hate that;" and this little pronoun "I," called by philosophers with the Latin name "ego," becomes the center round which cluster all these notions of our own yearnings and intentions, likes and dislikes, preferences and aversions, hopes and aspirations. In itself the word "I" is as empty as are all abstract terms, but how replete it is to each of us, containing all that constitutes the very core of our souls!

The contents of this term "I" or the "ego" which covers our continuous existence from the cradle to the grave, is our inmost being, our self, our personality; what we think and what we feel is the only thing that is truly ours, and we quote again a verse from Goethe who expresses this truth in poetic form thus:

"Ich weiss, dass mir nichts angehört
Als der Gedanke der ungestört

[4] For a description of the nature and origin of conscience, see the writer's *Ethical Problem*, pp. 119-124. The difference between the will of all and the common will is treated in *The Nature of the State*, pp. 15-16.

Aus meiner Seele will fliessen,
Und jeder günstige Augenblick,
Den mich ein liebendes Geschick
Von Grund aus lässt geniessen."

[I know that naught belongs to me
Except the thought that light and free
Out of my soul is flowing;
Also of joy each moment rare
Which my good fortune kind and fair
Upon me is bestowing!]

Our personality is and ought to be dear to us, and whatever may befall we ought to regard it as a sacred trust, and to keep inviolate its integrity, dignity, and honor our supreme duty. All other cares and responsibilities we may have are subservient to our main task in life, which is the progressive unfoldment, the constant enhancement and ennoblement of our self. Everything is secondary so long as we remain faithful to the ideal of our personality.

The word "person" is to a great extent a synonym of the word "soul," the main difference being that "person" is more comprehensive; for it denotes not only the essential but also the unessential and purely accidental features of man's individual existence. When we speak of man's personality we include his bodily appearance, and in fact think of it first, but we think of it as the expression of the soul that stirs behind it. We think of a man's personality as his face and stature, but the features and figure of a person are remembered as reflecting his character which is the guiding principle of his life.

Other nations have coined their words for personality according to its most obvious feature, the bodily appearance. In Chinese the word person is 身, *shan,* which also means "body" and was originally the picture of the figure of a man. In Pali, the language of the sacred books of the Buddhists, "person" is called by a compound word

namo-rupa, which literally translated means "name [and] form." To the people of Pali speech the personality of a man was first of all his name, and then his bodily appearance as it assumed a material form; but it comprises not only the name and form but also his past memories, the history of his life, his individual tastes, his inclinations, in a word, his character. As a man was known by a special name and recognized by his features and corporeal characteristics, these were considered as constituting his personality, or "name-form," *namo-rupa*.

* * *

The physiological problem of personality touches upon the larger problem of the one and the many. We mean by a person a certain unit, yet this unit is not an unchangeable monad, but the complicated system of a rich manifold. Several organs and their functions have been combined into a higher unity by organization. Physiological data as to the origin and development of personality teach us that the unit is due to a unification. It is the product of the cooperative tendency of an organism, of a complex which has to act in unison.

An organism grows. Every animal has developed from a cell by multiplication and all its parts are differentiated by a division of labor. The archetype is preserved in all of them, every organ being adapted to the work alloted to it by the nature of circumstances. It is a matter of course therefore that all parts harmonize. The roots, stem, leaves, flowers and fruits of a plant show a certain agreement because they have all originated from the same pattern. They are mere modifications of the original design, and the various functions cooperate in the service of the whole.

The cooperation of parts in animal organisms is more systematized than in plants. The different organs of a

creature possessed of purpose, are so closely united that they must act in concert. They are no longer coordinated but subjected to a centralized government. The limbs are subservient to the purpose of the whole evinced in volitions which have their seat in the brain whence orders are issued for general cooperation. This systematization is carried to a still higher perfection in man, the rational animal who by the machinery of speech acquires the faculty of thinking in abstract terms, and thus is capable of testing his own concepts and reaches an objective comprehension of facts. Man learns to distinguish between truth and error, between right and wrong, between good and evil, and he is expected in his decision and deeds to use the best judgment of which he is capable.

Not all men are consistent; some vacillate to an extraordinary degree. But upon the whole, there is a general convergence of impulses in the mental makeup of everybody, which in spite of some contradictory tendencies produces a unity of volition and furnishes the basis of what may briefly be called character. All the doings and inclinations, the preferences and tastes of a man, are as much in agreement as are the roots, leaves, flowers and fruits of plants. There is a type which pervades the several parts, and this type reappears in the unification of the whole, where it effectually dominates the entire attitude and behavior of the individual. This is the keynote of a man's personality, and by a "man of personality" we mean a person whose character is clearly determined and well defined.

In a person the dominant feature is registered in his will but the will of intellectual persons is guided by the mind, which means that their decisions are influenced by rational deliberation.

Man's soul is like a commonwealth of sensations, notions, ideas, and other psychic functions. Man's will is

like a king within it. The will decides, the will acts, and the will is always inclined to assert itself irrespective of other considerations. A man of the lower type will follow the first impulse if it be strong enough at a given moment; but in a higher man the will is like a constitutional king who waits with his decision until he has taken counsel with his trusted minister of state, and has become assured of the general assent of the nation. A wise man refrains from rushing into acts. In him the first impulse is checked by some such thought as, "Wait, let me consider the consequences." The counsel which a ruler takes is comparable to the intellect, or the mind; and the higher mankind rises in the scale of evolution, the stronger grows this power of inhibition, resulting in what ethicists call "self-control" in consequence of which the influence of the mental process of deliberation increases.

The intellect is not a faculty any more than is the will, but it is a collective name for the sum total of experiences as arranged in a systematic order. There is no special faculty called the will. By will psychologists understand "the tendency to pass into act." A motor idea when stimulated one way or another, innervates its respective set of muscles and makes them contract thus serving the purpose of the intention, and the tension preceding the act, at the moment of its release, is called "will." But it is essential that the process should not be purely physiological but must pass into consciousness—the domain of psychology—while touching the motor idea. In order to render an act of the will complete, the motor idea should be associated with the ego conception expressed in the word "I" which, as it were, sanctions its passing into act by thinking "I will it." Should a stimulus leading to a muscular motion be purely physiological, the process would not be an act of the will, but a mere reflex action.

Though the will is not a faculty we can speak of the

attitude of the ego consciousness when allowing motor ideas to pass into act, as "the will."

The pragmatic view, so fashionable now, describes the actual state of things on the lower plane of mankind. Its founder has taken a dislike to the intellect and has opened a campaign against what he calls "vicious intellectualism." Prof. William James is satisfied to point out the power of "the will to believe," but he neglects to inquire into the rare cases of the influence of the still small voice of the intellect which modifies and even radically changes the belief, yea the character of a man in spite of his will. As a psychology, pragmatism presents us with a correct, or fairly correct, picture of the average type of man, but as a philosophy it is a failure because it treats the average as the standard and overlooks the existence of a higher type.

In the realm of science the supremacy of the will is sheer atavism, for it represents man as he has just emerged from brute existence; when man ceases to be a slave of his instincts, a child of blind impulses, when he begins to be influenced by his intellect, when he begins to learn the lessons of life, when he forms ideals and aspires for higher aims, when he considers his highest duty to be self-education, and an actualization of his higher potentialities, when he feels responsibilities—then only does he become a person in the full sense of the word.

* * *

The history of the word "person" is of great interest. To be sure the etymology is absolutely unknown, for the common derivation of classical tradition from *personare,* to sound through, mentioned by Gellius (V, 7) is philologically impossible on account of the different quantity of the *o*. But we know positively that *persona* was a term of the stage denoting the mask of an actor, the part he played, the rôle which he learned by heart—thoughts expressed in words accompanied by definite actions.

this organic theory and going to the other extreme criticises it as a nuisance (*Schädling*) which has burdened jurisprudence with the fictitious existence of a juridical agent endowed with legal functions, and ought to be set aside. In a scholarly essay entitled *Persona und πρόσωπον*, Professor Schlossmann has collected almost all the philological material on hand and fulminates his anathema against Gierke's view. He certainly succeeds in proving that the Latin *persona* is not a translation of the Greek *prosopon,* but that both words have developed independently into the meaning of person, influencing each other as two electric currents affect each other by induction (*loc. cit.*, p. 99). In truth the word acquired the meaning of person only under the influence of the Latin conception of *persona,* and this was done not on the ground of juridical considerations but of theological discussion on the nature of the Trinity. Wherever *prosopon* is used in the sense of *persona,* or *aprosopos* in the sense of not having a *persona,* we can point out an actual or highly probable influence of Latin thought upon the author who thus uses these words. Professor Schlossmann shows that Dionysius of Halicarnassus had become accustomed to this convenient term during a sojourn at Rome of more than twenty years. Herennius Modestinus, however, was practically a Roman who wrote in Greek, and so his use of *prosopon* in the sense of *persona* may be regarded as a Latinism.[7]

The use of the Greek *prosopon* has unquestionably been influenced by the Hebrew *panim*,[8] where the word is used in a loose sense frequently merely as a preposition "in the face of," which simply means "in front of." This use of

[7] See Schlossmann, *loc. cit.*, pp. 47-48.

[8] פָּנִים. It is derived from פָּנָה which means "to turn." While the Hebrew term is a pluralitantum it is noteworthy that the Greek expression "in the face of" is always used in the singular. Cf. Luke ii. 31; x. 1. For further passages see Schlossmann, *loc. cit.*, pp. 53 ff., especially p. 55.

prosopon is late and does not antedate Christianity, but can be directly traced to quotations from the Septuagint.

In theology the term *hypostasis,* Latin *substantia,* "that which underlies," was used to denote the nature of the three aspects of the Trinity by the Latin Church Fathers, especially Tertullian who replaced this neo-Platonic term by *persona.* And here, in spite of the learned authority of Harnack and his followers,[9] Professor Schlossmann is right who says that Tertullian did not introduce the term *persona* from the nomenclature of jurisprudence, because it did not exist as such, or at least was used only sporadically. In fact there are only two places in which *persona* is used in a sense approaching our modern conception of a juridical person. These are found in Frontinus who speaks of *persona coloniae,* thus personifying a Roman colony, and in Agenius Urbicus who speaks of *personae publicae,* also called coloniae, which hold definite places assigned to them and are commonly named *praefecturae.*[10]

On the other hand, the use of *persona* in the modern sense as a person (not as a mask on the stage) is quite old and occurs as early as in Plautus (*Persa,* 783) where Dor-

[9] Harnack is supported by Loofs, *Realencyc. f. d. prot. Theol.,* IV, p. 40. Bethune-Baker, "The Meaning of Homoousios, in the Constantinopolitan Creed" in *Texts and Studies,* Vol. VII, pp. 21 ff.; Hatch, *Griechentum und Christentum* (Ger. tr. by E. Preuschen), p. 206 ff. He is opposed by Esser in Wetzer and Welte's *Kirchenlex.,* XI², p. 142, 2; Bardenhewer, *Geschichte der altkirchlichen Literatur,* II², p. 388, and Seeberg, *Lehrbuch der Dogmengeschichte,* I, p. 87, and by Schlossmann himself, from whom we quote this bibliographic note.

[10] The passage from Frontinus (De controv. agr. II in *Röm. Feldmesser,* by Blume, Lachmann and Rudorff, I, pp. 54, 23) reads: "Est alia inscriptio quae—inscribitur 'Silva pascua' aut 'Fundus Septicianus, coloniae Augustae Concordiae.' Haec inscriptio videtur ad personam coloniae ipsius pertinere neque ullo modo abalienari potest a republica."

The passage in Agenius (8, 6; *loc. cit.,* I, p. 16) reads: "Quaedam loca feruntur ad publicam personam attinere, nam personae publicae etiam coloniae appellantur. Quae habent assignata in alienis finibus quaedam loca, quae solemus praefecturas appellare. Harum praefecturarum proprietates manifeste ad colonos pertinent—sunt et aliae proprietates quae municipiis a principibus sunt concessae."

Another later quotation from Ulpianus (Dig. IV, 2. 9, 1) has been used for the same purpose but is less convincing. We shall quote it nevertheless. It reads: "et ideo si singularis sit persona, quae metum intulit vel populus vel curia vel collegium vel corpus, huic edicto locus erit."

dalus, one of the characters of the play, swears "at the Persian, at all the Persians, and in fact at all persons."[11] The explanation that *personas* might here mean the masks on the stage is too far fetched to be entertained. While the pun suggests the use of the word person, the passage proves that the word was then used in its present acceptance.

The juridical usage of person, however, is isolated in classical times, and does not appear elsewhere in juridical writings. Even in the *Institutiones* of Gaius, its use is not far from the common acceptance of the word, and we read for instance (*Inst.*, III, 14, 2) that "an inheritance not yet entered upon still maintains the place of the person not of the future heir, but of the deceased." Certainly Tertullian used the word *persona* in the popularly accepted meaning, and if he had introduced the term from jurisprudence he would have said so.

During the time of ecclesiastical controversies concerning the nature of the Trinity, the Latin Church insisted on the formula that God, Father, Son and Holy Ghost, are three persons and one substance, and not until then were the words *prosopon* and *hypostasis* identified.

On the other hand the Greek idea *hypostasis* has influenced the conception of *persona* which appears mainly in the oldest definition of the word still extant as given by Boethius who introduces the term *substantia,* the Latin translation of *hypostasis,* saying:

"Quocirca si persona in solis substantiis est atque in his rationalibus, substantiaque omnis natura est, nec in universalibus sed in individuis constat, reperta personae est igitur definitio: Persona est naturae rationalis individua substantia."

Other definitions, especially that of Cassiodorus, repeat

[11] See Schlossmann, *loc. cit.*, p. 15. The passage reads: "Qui illum Persam atque omnes Persas atque etiam omnes personas male di omnes perdant.

the same idea in somewhat different form: "Persona ver hominis est substantia rationalis individua suis proprietat bus a consubstantialibus caeteris segregata."

The identification of two different terms such as *hyp stasis* or *substantia* and *persona* indicate the presence two currents of thought, one philosophical the other m tico-religious, which were finally merged into one; but the differences blazed forth in the animosity of the *furor theologicus* recorded in ecclesiastical history. The differences continue even to the present time though they find other terms as exponents of two contradictory views.

The controversy was set at rest by repeated official declarations that the quarrel was purely verbal, and so we find both *prosopon* and *hypostasis* repeatedly used together with ἤτοι or ἤγουν, as if to emphasize that the two terms mean exactly the same. In Latin ecclesiastical manuscripts the two words are used synonymously in the same manner: *personae seu subsistentiae* or *personae vel subsistentiae*.[12]

According to Schlossmann the importance of the term *persona* in antiquity has been greatly exaggerated since it appears to have meant merely one who plays a part, so that the expression "slaves are not persons" simply meant that slaves played no part before the law, their rights were ignored by the law. It is noteworthy that the Greek *aprosopos* occurs in Theophilus who has obviously been influenced by the Roman usage of the word *persona*.

The history of the theological use of the term "person" certainly proves that the idea of personality with reference to the deity is rather late and leaves to those who object to the use of the term the excuse of being the result of

[12] Some theologians, for instance the Roman Diaconus Rusticus, in his *Disputatio contra Acephalos*, use *subsistentia* in place of the more common *substantia* in order to give more dignity to the term, which in its abbreviated form had ceased to mean "that which underlies" and was commonly used in the sense of "substance."

ecclesiastical quibbles, in which two such different terms as *hypostasis* which means a substratum and *persona* which means an individual being, have for insufficient reasons been finally declared identical.

Prof. F. Max Müller wrote a short essay on the same subject which he has published under the title *Persona.*[13] It is a most interesting and instructive sketch pointing out that *persona* originally meant the mask of an actor and then the part he played, the words he had to say on the stage, and the actions which he had to perform.

There is, however, one point in which Max Müller is mistaken. A person *is* the part which a man plays in life; he *is* the character which, as it were, he acts. His person manifests itself in the sentiments which sway him, in the deeds he performs and in the words he says. Our sentiments, thoughts, words and deeds form a harmonious whole, they constitute a systematic unity, and in this their totality they constitute our personality; they are our self. Every one of us plays his own part in life. He is the actor who acts himself. In other words he has not memorized a part which some one else has conceived and written down. He is the poet who improvises the rôle which under given situations he wants to have performed. The part which a man plays is of his own making. However, Max Müller conceives a person not as the part he plays, but as the actor only. He distinguishes between the two, and regards the part which a person plays in life as a performance that is foreign to him. While in real life a man is the part he plays in the world, the actor on the stage may be very different from it. For instance he who plays Judas Iscariot in the passion play at Oberammergau, may have nothing in common with the character of the betrayer of Jesus. Max Müller's view is dualistic. Following the speculations of the old Brahman Vedantism, he conceives of the soul as a

[13] Chicago: The Open Court Publishing Co., 1908.

metaphysical being behind our actual existence, as a thing-in-itself, a passive witness, and a mere spectator. We will let him explain his view in his own words. He says: "Let us remember that *persona* had two meanings, that it meant originally a mask, but that it soon came to be used as the name of the wearer of the mask. Knowing how many ambiguities of thought arose from this, we have a right to ask: Does our personality consist in the *persona* we are wearing, in our body, our thoughts, or does our true personality lie somewhere else? It may be that at times we so forget ourselves, our true Self, as to imagine that we are Romeo and Juliet, King Lear, or Prince Hamlet. Nor can we doubt that we are responsible each for his own *dramatis persona,* that we are hissed or applauded, punished or rewarded, according as we act the part allotted to us in this earthly drama, badly or well. But the time comes when we awake, when we feel that not only our flesh and our blood, but all that we have been able to feel, to think and to say, was outside our true self; that we were witnesses, not actors; and that before we can go home, we must take off our masks, standing like strangers on a strange stage, and wondering how for so long a time we did not perceive even within ourselves the simple distinction between *persona* and *persona,* between the mask and the wearer."

The truth is that if life is to be compared to a stage we play our own parts, and the characters which we represent exhibit our own personality. On the stage the actor behaves as his part demands; his part does not belong to him; the poet is responsible for it, not the actor who has learned it by heart and speaks it by rote. In actual existence the mask and the actor are one and the same; the parts we play are not foreign to us, as Max Müller claims, but they are the true and only expressions of our inmost being, of our personality.

We have seen that one's personality must to every one be higher than all his possessions, because it constitutes the man himself, the owner of all his earthly goods. Thus it is obvious that the worth of one's personality is not only more valuable than any property, but it is also different in kind. In the history of mankind the recognition of the dignity of personality shows itself in our legal and habitual notions of respect for human lives. It is considered a duty at any cost to save or rescue a man who is in danger of death, and in comparison to the jeopardy of human life all commercial goods and their values are deemed a negligible quantity.

Kant in his definition of personality declares that a person should always be considered as an end in itself, and this holds good for our own person as in the case of other persons with whom we are dealing.

We ask now, (1) What is the nature of this exceptional place we assign to personality? (2) Is every personality of equal dignity? and if not, this leads to (3) What is the objective standard of the worth of personality?

The first question is answered when we remember what personality is. A person is an individual that is possessed of reason. It is a social being, which means that it is a member of a community, endowed with speech as the means of a communication of thought, and conscious of rights as well as duties, capable of pursuing purposes, and responsible for its actions.

If we adopt the old Brahman idea as advocated by Max Müller we would be compelled to believe that what we call "person" is a mysterious agent behind all the characteristics and deeds of a personality. If that were truly so all persons would be of equal value, for they are mere spectators, and what they are or do in life concerns them as little as the actor can be held personally responsible for the crimes he commits on the stage when performing the

part assigned to him. Buddhism denied the Brahman view of the metaphysical nature of the self, and modern psychology, sometimes erroneously called the psychology without a soul, follows the same line of argument in denying the existence of a soul in itself. According to this view a person consists of his thoughts and volitions. He is not the owner of his qualities but the sum total of all of them. The Brahman view has originated through a philosophical mistake which hypostasizes the idea of the thing and treats it as a thing in itself. It is a common habit to say that the tree has roots, a trunk, foliage, blossoms and fruit, while in fact the tree consists of its parts. We say a table has legs, and a top; that a wagon has wheels, a body and a tongue; but we ought to say that these objects consist of their several parts. They are combinations, and this very combination makes the thing what it is. Lowell says:

> "Roots, wood, bark and leaves, singly perfect may be,
> But clapped hodge-podge together, they don't make a tree."

The unity of a personality is of high importance, and according to conditions it is more or less significant. Sometimes the very systematic character of a personality adds to the value of a man's thoughts by giving them their proper setting and interrelation with other thoughts. However, the unity of a person is a unification and since a unification consists of qualities, we shall readily understand that a person is not a special being or essence but their harmonious combination in an organized form; and the worth of a personality can depend only on its character, its contents. We range one person higher than another if his character is superior, if his intelligence is higher, if his sentiments are more humane and refined.

The rationality of a person's mental operations means that his soul has become an incarnation of the world order, the universal logic of natural law, the eternal norm of ex-

istence, called in the terminology of Christian doctrines, the Logos. It includes the recognition of moral obligation, popularly called conscience, and constitutes the divinity of man which is forfeited only by those who by deeds prove that they themselves do not respect the dignity of personality in others, that for selfish reasons they would not shrink from taking the life of one of their fellow men.

When we consider the composite nature of personality we become aware of the fact that different persons are different in character and mental equipment. Thus they are not equal and their comparative worth can be measured by the general desirability of their moral and mental capacity together with a consideration of the strength, seriousness etc., of their intentions and volitions.

* * *

For an analysis of the nature of personality it is most indispensable to understand the part played by ideas in the economy of our mental life.

It is natural that, misled by the mode of language, we fall into the mistake of the ancient Brahmans in imagining that we have ideas. Though we consist of ideas, we objectify them and treat them as if they were commodities. We say that we adopt opinions as if we appropriated them. But the truth is the reverse. Ideas, opinions, or convictions take possession of us, sometimes against our will, which means against the conviction which we held before, or properly speaking which was in possession of our soul. Our soul is the battle-ground where conflicting views are waging a bitter warfare for the supremacy among many contrary volitions. Our mind is like a commonwealth inhabited by various ideas. These ideas combine and produce new ideas. At the same time, experience as well as intercommunication with others introduces immigrants. New ideas enter. Sometimes they are invaders, and if these immigrants are at variance with those ideas that are

in possession, parties are formed and a civil war arises until one side becomes dominant. When a powerful invader is victorious, we have an instance in which we become converts to a new conviction in spite of ourselves.

It is apparent that ideas lead a life of their own. They grow and develop. They migrate from soul to soul. They are transferred by the way of language and through writing. Ideas themselves originate, grow and change. In the course of their migration they become more or less modified and adapt themselves to new environments. They struggle among themselves. Some are victorious, others succumb; some are exterminated, others survive. They fit themselves into a system in which some of them take the lead while others remain subservient.

Ideas are the most potent factors in the history of mankind. Wherever they reside in human souls they are aglow with life and sentiment. But in their transmigration they may be conveyed by mechanical means in script; they may shrivel up into small inky letters on paper and in this shape they may lie concealed in unfeeling forms of dead matter. They may be incorporated in books or manuscripts or other symbols, and yet like grains of seed which fall into fertile land, they may revive whenever they impress themselves through the senses into the brain of a living being. Indeed ideas are wonderful things, for they are the vehicles of all spirituality. In order fully to understand our own personality we ought to be able to trace back the life of the ideas of which our souls are composed to their very origins, and to their most primitive original conditions which always start in sensation, or, broadly speaking, in making experience. They coalesce with and draw conclusions from previous experience, or react somehow on the impressions of the surrounding world, and in doing so they give meaning to life.

Without going astray or being fantastical we may com-

pare ideas to real persons. At least the idea we have of persons is after all the most appropriate simile we have to characterize their being. Think only of moral ideas, of ideals, of religious sentiments! They enter the soul of a man and take hold of his entire existence often in spite of his will. And what a profound truth lies in the dogma of resurrection! Jesus the Crucified has actually risen from the dead, and where two or three are gathered together in his name, he is present.

* * *

The behavior of ideas is rather impersonal, and we may characterize them as interpersonal existences. Lichtenberg, a contemporary of Kant, struck the right chord when he objected to the expression "I think," and claimed that we should say, "it is thinking" just as we say, "it is raining" or "it is snowing" or "it is thundering." It is a fallacy to imagine that there is a certain I, an ego who does the thinking. This is the old metaphysical mistake. The truth is that thoughts arise in living beings according to conditions. There is no ego that produces thoughts, but *thinking takes place,* and in the process of thinking, thoughts are shaped. We do not deny that the idea of the ego is a highly important contrivance in the household of nature to make thinking possible. But the ego is after all not the cause of our existence but the result and product of it.

What is the nature of the ego?

The ego represents the sum total and summary of the component parts of a person, and is used in this sense as a synonym for personality. The word "I" is a pronoun, a brief term which stands for a noun, and the pronoun "I" always stands for the speaking person. In itself, therefore, the "ego" is meaningless. It is a mere shorthand sign for the speaking person and its true content is determined by the personal characteristics which it denotes.

The ego identifies itself in different persons with different ideas which dominate the commonwealths of their souls. Ideas themselves however are representatives either of concrete things or classes of things, or of the interrelations among things, or of aspirations and plans to accomplish certain aims, and the value of ideas depends upon their significance, their range and applicability to real life, and above all upon their truth, which means the correctness with which they represent either objective reality or the right way of dealing with reality.

Accordingly there is unquestionably a standard for the value of ideas, and if of ideas, then also of man himself. The truer and clearer a set of ideas mirrors the world, the more valuable they are; and the more perfect a man's soul reflects existence as a law-ordained cosmos, the higher he ranges in the development of life.

* * *

We have seen that a person is a systematic arrangement of ideas, taking here ideas in the broadest sense of the word including sentiments, hopes and volitions. We have further seen that ideas are interpersonal beings migrating from soul to soul. We will now call attention to a subject very much neglected and frequently misunderstood, which is the part played by superpersonalities. In the development of mankind we frequently meet with institutions such as the church, the state, and also systematized sets of truths, such as the several sciences, mathematics, astronomy, chemistry, etc. These systems of ideas, whether purely theoretical as the sciences, or whether incarnate in institution such as states, churches, etc., possess a life of their own. They are not limited to science, religion and politics but deal also with business and any other possible affairs. Every municipality has a character of its own, and the

same is true of business concerns, factories, corporations, societies and even clubs. They are, as it were, superpersonal presences which consist of persons and continue to preserve their character even when the old members are replaced by new ones. Such superpersonalities are not nonexistent, but they lead a life of their own. Although corporations are said to have no souls, each one is possessed of a definite character, and different corporations differ in dignity and other qualities as much as do individuals.

It is important for us to understand the significance of superpersonalities because without a due appreciation of them we cannot understand either religion or patriotism. Superpersonalities live in ideals and it is by no means indifferent in what way groups of persons are associated together. Superpersonal interrelations in politics are of great consequence, and it is very important how citizens are united into states, whether in the shape of a republic, or an absolute monarchy, or a constitutional government, and every form of a national constitution has the tendency of self-preservation which, however, is subject to modification through natural growth—sometimes through revolution.

There ought to be founded a special branch of psychology to determine the constitution, logic and sentiments of superpersonal presences. To some extent, but not altogether, it would be identical with, or at least similar to, the psychology of the masses. We must bear in mind that the psychological aspect of a superpersonal presence consists in certain brain structures distributed over a greater or less number of persons who are inspired with the same or similar principles and tendencies, and so they cooperate in more or less clearly defined concerted actions.

We may define a superpersonal presence as a systematic set of ideas which form a higher unity, and there are great varieties of such systems of ideas. If they enter into his-

tory as dominant principles we speak of them as "historical movements." If they take shape in visible form, if buildings and property are set aside for their uses, or if in their interest duties are assigned to officers, we speak of them as "institutions"; if they are types set forth for imitation we call them "ideals," and if they are chartered by law and have their functions duly determined they become "juridical persons." At any rate they differ greatly in dignity and may be as flippant in character as a bridge-club, or as serious as a church, or as awe-inspiring as a god of pagan antiquity.

It is typical of the human mind to personify these superpersonal presences; and so the powers, phenomena, and laws of nature, such as the thunderstorm, the sun, the moon, the sky, the ocean, etc., and also the factors of human society, courage, wisdom, science, war, are represented in poetic figures as Zeus, Athene, Vulcan, Mars, Venus and the other gods of the pagan pantheons. These conceptions have been as influential in the life of the several nations as if they had been living beings guiding and directing those who believed in their existence. In this sense we must look upon them not as mere fiction, but as real and definite agencies whose nature is of higher consequence than even historical personalities, leaders in peace and war, and law-givers.

On the other hand there are historical personages who change, or at any rate are transfigured, after death into superpersonal presences. The mortal coil is shuffled off and they become paragons of the virtue or the ideal which in some way or other they have come to represent. This idealization of historical persons takes place everywhere in history, and we can observe the process even now. Bismarck has become the Paladin of German unity and it was quite appropriate to represent him in a colossal statue as the figure of the mythical Roland. In the United States

Washington has received a similar veneration and the same happens over and over again in all climes and countries. Even a living man still dwelling with us in the body may be dignified by coming to stand for a superpersonal idea. Alexander the Great very adroitly had himself worshiped as the son of the god Ammon and even in his coins he carries the ram's horns which symbolize this belief. Napoleon instinctively, perhaps purposely and shrewdly, imitated his example and managed to have the press of the day picture and characterize him as a kind of reincarnation of Cæsar.

As a rule, however, a person is thus dignified only after his death. Indeed he frequently comes to be revered as such a superpersonal ideal by suffering martyrdom for a great cause. And Schiller says truly:

> "Denn was ewig im Gesang soll leben,
> Muss auf Erden untergehen."
>
> [What shall live in song forever
> That must perish here on earth.]

The figures of the polytheistic gods are but little appreciated to-day. Historians in ancient Greece and in modern times have investigated whether or not Heracles existed, where he may have lived, and whether there is any historical nucleus of his labors. At the time when paganism broke down people began to doubt the historicity of Heracles. Then this superpersonal figure of the Greek hero began to fade in the memory of the people. Such is the death of superpersonalities. The hero died and was supplanted by other ideals offered in the growth of a new religion called Christianity.

During the prime of Greek civilization, Heracles was by no means a nonentity. He was an important factor in the intellectual and moral life of Greece. He moulded the character of young men. He inspired them with motives of high courage and other virtues, and in the same way

all of the gods must be regarded as superpersonalities who were no mean presences in the life of the nation where they prevailed.

From such considerations we must also approach the superpersonalities of the Christian faith, especially the figure of Christ. From this standpoint we shall understand that in a certain sense and for the main purpose, which is the inspiring influence of the Christ ideal in the hearts of believers, it is quite indifferent whether or not Jesus was an historical person.

Jesus the Galilean who lived nineteen centuries ago in an obscure corner of Palestine can be of no possible use to us unless he becomes a real presence in our lives, and this means that he must be raised to the power and dignity of a superpersonality—of an ideal which to the dull eye of the uninitiated seems to be a mere nonentity, but is in truth a guidance for our conduct and a dominating factor in our lives.

* * *

The God of Christianity has supplanted the ancient gods of paganism, and we can understand why he has been so much more potent than they. He does not represent one or another power of nature. He stands for the totality of all that exists and also the creative faculty which has produced the world and continues to mould it. The Church Fathers, as well as the Christian philosophers who succeeded them, especially Athanasius, Augustine, Anselm, and Thomas Aquinas, worked out the doctrine of Christian philosophy. They gave considerable thought to the idea of personality, and after many internal struggles finally shaped the conception of this highest superpersonal presence in the doctrine of the Trinity, or more properly speaking Tri-Unity, of God. The orthodox churches insist most vigorously on the dogma that God

is one and only one, but at the same time that there is in God a trinity of persons, which means that the deity manifests itself in three modes and each mode constitutes a unity in itself.

It is well known that the Buddhists too believe in a Trinity which consists of the Buddha, the Dharma, and the Sangha, i. e., (1) the Enlightened Teacher, (2) the Truth, and (3) the Brotherhood or Church. It is called the *Triratna* or the "three jewels," and is conceived as three personalities, called the *Trikâya,* or in Chinese 三身 *san shan.* Not unlike the Christian Trinity, the three persons of the Buddhist Trikâya represent the three phases or aspects of God, or whatever we may call the object of religious worship.

In the Mahayâna doctrine the three kâyas are thus described: the Dharmakâya, the body of the good law, is the system of all religious doctrines; the Nirmanakâya or the body of transformations, is the development of truth in the evolution of life finding its climax in the personality of a Buddha; and the Sambhogakâya, the body of perfect bliss, is the eternal world-order, the sum total of all the verities of natural and moral laws which dominate all existence, whose revelation is the Dharma and whose incarnation in human form is called the Enlightened One, the Buddha, he who has found the truth and teaches it.

The Sambhogakâya is, as it were, the static aspect of God, while the two others are dynamic. The Nirmanakâya is kinetic and the Dharmakâya potential; and all three are one and the same,—just as energy remains the same in all its phases and transformations.

The Sambhogakâya corresponds to God the Father in Christian doctrine, and from him proceed both the Nirmanakâya, and the Dharmakâya; the three are one and the same, though each of them is conceived as a personality (*kâya*) of his own, and the three are present in their human

Trinity can scarcely be doubted, although most arguments and explanations have been formulated more instinctively than with clear philosophical insight and logic.

* * *

In a certain sense the Christian God-conception is as much a superpersonal presence in the minds of the people as were the pagan deities whom it supplanted. But after all there is in Christianity an aspect of the conception of God which is higher and which comes to the surface if we dig down to the bottom rock on which rests this grandest thought which the religious consciousness of man has been able to produce. The purpose of the God-conception is to represent that universal and eternal presence which shapes existence in its totality and in every detail; it denotes that reality in which we live and move and have our being, the ultimate authority of right and wrong, the standard of truth and error and the eternal norm of all existence, and the idea of this omnipresence is a superpersonality in the highest sense of the word.

Is such a conception a mere illusion, or does it represent some actuality? And here we will say that the facts of experience compel us to grant that the religious instinct of man has assuredly not been misguided on this point. The formulation of the deity as an individual being, its personification, its humanization, and the childish notions connected with it, the idea that God is like ourselves, an egotistical, vainglorious and imperious person, are superstitions which naturally arise in immature minds. But the underlying truth of it, that there is a norm of existence, that the nature of right and wrong, truth and error and the general lawdom of cosmic existence can be definitely determined, cannot be denied, for our very existence as rational beings, the possibility of science, the actuality of human reason, the reliability of logical argument, the fact

that we are ensouled with moral aspirations, the gist of human life and its significance, bear testimony to it. All these phenomena, so important in our experience, prove that there is an eternal norm, and this norm which in our lives becomes the authority of conduct is God.

In a certain sense God is supernatural, for the world-order of which we can reconstruct the purely formal features in pure mathematics and logic, is the condition not only of this actual world of ours but of any possible world. It applies not only to nature as we know it from experience, but to any possible nature whether it exists in spheres unknown or merely in dreams. Its validity is without exception; it does not contradict nature but, in this sense, it is above nature—it is supernatural.

This supernatural God constitutes a system of norms, and whenever we try to formulate them in clear rules or theorems such as those propounded in mathematics, these eternal norms are seen to be a system, and constitute a unity so as to be comparable to an organism of which all parts are organs whose functions are fully understood only when considered in their cooperation. They are co- and sub- and superordinated parts, and their significance appears only when considered in their unity. In this sense God bears a close resemblance to a person and in this sense only we may speak of the personality of God, for we must bear in mind that God is not an individual or a person as is man. The personality of man is temporal; the personality of God is eternal. Man's thoughts are consecutive, God's thoughts are the truths which neither originate nor pass away; they are the laws of nature, the determinant factors of all that happens. The thoughts of man are discursive phases of reasoning. They are centered around his ego, and they are subject to error. There is no ego in God, and his thoughts, being eternal, are infallible, and the potency of their application is unfailing.

Man has developed into a person, into a rational being capable of searching for the truth and following definite purposes, because the world is dominated by a consistency of being which mirrors itself as universal law, and in this sense man, the incarnation of reason, has been shaped by the world order, and it may fitly be said that he has been created in the image of God. While man is like unto God we may in poetic language personify God as if he were like unto man, but in fact he partakes in no wise of man's limitations; he bears no features of transient individuality but is eternal and omnipresent while man is concrete, local, and transitory.

The difference of God's personality, or rather superpersonality, is not in degree but in kind. As Yahveh, the God of Israel, says in Isaiah lv. 8-9, "My thoughts are not your thoughts, neither are your ways my ways...For as the heavens are higher than the earth, so are my ways higher than your ways, and my thoughts than your thoughts."

There is one more reason why the term superpersonal can with special propriety be applied to God, and it almost eclipses all others, and contains all of them. It is this, that God—the superpersonal God as here described—is the prototype of all personality. The character of the universe the constitution of the cosmos, its inmost being and significance reveals itself better and more completely in a person than in any other object of creation, and so we may conclude with the statement to be interpreted in the light of the foregoing expositions, that every person in the measure that he attains the ideal of personality is a revelation of God.

* * *

The mystic standpoint in its most modern formulation is represented by F. Max Müller, but though it finds adherents to-day among spiritists, theosophists and other rep-

resentatives of the New Thought movement, it is a well-established view among many orthodox people, not only of Christianity but of any religious system of the world. In truth, it is as old as mankind and was worked out for the first time by the Vedanta philosophers of ancient India, and summarized by Shankara Charya. We reject this view in its extreme formulation and have pointed out that it is based upon the error of reifying the unity of a compound thing. The unity of a thing is the combination of its parts, not a mysterious thing in itself. There is not a metaphysical entity called "wind" who performs the function of "blowing," who causes the commotion of the air, but this commotion of the air, the blowing of the wind, is the wind itself. In the same way the cooperation of all the organs is the organism. There is not an organism in itself, there is not a life principle, or a metaphysical self (called atman by the Vedanta philosopher) which animates the several organs, but the cooperation of all the organs produces that organized whole which we call the entire organism. The organs have originated through a differentiation of function and in their combination they produce a higher unity. It is true enough that a unity existed before, for instance first in the undivided cell, but the higher unity, or generally stated the gradation of the unity of an organism from a lower to a higher range, is always a product or an effect, not a cause; it is due to the cooperation of its parts. It is therefore wrong to assume a mysterious entity or a metaphysical essence which constitutes the unities of things and assumes a mysterious principle to account for the non-material interrelations of parts which produce new and higher unities.

Turning to the other side, we are confronted with a theory that disregards the significance of pure form and would accept only materiality as real and significant. The materialist who in judging of the value of a statue would

only take cognizance of the metal of which it is made and who would measure its worth by taking its weight, disregarding its shape and showing no appreciation for its beauty, is incapable of seeing that the combination of several factors produces a new thing. Three lines crossing are not three lines but constitute a triangle with all its wonderful complications with which we become acquainted as geometry and trigonometry, and the same is true of all combinations. The whole intellectual world with all its wonders rises from combinations of very simple and elementary factors of feelings, and the final result is that wonderful product which we call personality in which the eternal laws of being are reflected.

While appreciating the significance of form and formal laws as developed in pure logic and pure mathematics and not accepting any mystical theory of the universe, we nevertheless comprehend the significance of purely formal laws and understand what mystics mean when they are overawed by the profundity of the significance of unity, of that mysterious item which produces new values through a mere combination of parts. Therfore we deem it not inappropriate to use the terms of religious conceptions, such as God, soul, and immortality, but it will be noticed that all the religious terms thus employed and thus justified find a rigorously scientific explanation.

We anticipate that the extremists on both sides will be little satisfied with our methods, but we are confident that those representatives of either party who see deeper will join us, and in the propositions here presented they will find the true solution of an old problem that has vexed mankind for millenniums.

Readers somewhat acquainted with the history of philosophy will notice that the treatment of the idea of personality here attempted constitutes a reconciliation between the two opposed views, the mystico-religious interpreta-

: facts, and the rigidly scientific conception, either of in its extreme formulation must be regarded as con- :ory to the other. We claim that both, if rightly under- come to the same conclusion, so they are comple- ry, the one to the other, and emphasize two truths— uths which form a contrast without being contra- y to each other, each of which by itself being one- and so the two demand each other for the sake of :teness.

EDITOR.

PSANTERIN ACCORDING TO DANIEL III. 5.

PSANTERIN, a loan word from Greek ψαλτήριον, is found only in Daniel iii. 5, 7, 10, 15,—being the name of a musical instrument.[1] In the following pages I shall attempt to establish the identity of said musical instrument, and at the same time trace the history of the word itself in the course of its wanderings through various languages, down to the present day.

The Greeks knew of an instrument called ψαλτήριον, as early as the time of Themistocles.[2] It did not, however, become common among them previous to the widespread diffusion of Oriental manners and customs, during the later centuries of their history. Even at that, scattered references to it in Greek and Latin documents are few.

1. Plut., *Themistocles*, 2.

Λέγων ὅτι λύραν μὲν ἁρμόσασθαι, καὶ μεταχειρίσασθαι ψαλτήριον οὐκ ἐπίσταται, πόλιν δὲ . . . μεγάλην ἀπεργάσασθαι.

2. Plut., *Antony*, 24.

Κίττου δὲ καὶ θύρσων καὶ ψαλτηρίων καὶ συρίγγων καὶ αὐλῶν ἡ πόλις ἦν πλέα, Διόννσον αὐτὸν ἀνακαλουμένων.

3. Plut., *Mor.*, p. 713 *c*.

Οὕτω ψαλτηρίου φωνῆς καὶ αὐλοῦ καθ' ἑαυτὴν τὰ ὠτὰ κοπτούσης μὴ ὑπακούωμεν.

[1] *Psanterin*, iii, 7,—*psanterin*, iii, 5, 10, 15, the form with t being correct. In connection with *kitharos* (κίθαρις) and *sumponyah* (συμφωνία), it serves to determine the date of the book of Daniel, as showing that it must have been written subsequent to the diffusion of Greek influence and language in the Orient.

[2] Plutarch, *Themistocles*, 2.

4. *Ibid.*, p. 827 *a*.

Ἤδη μέντοι (sc. ὁ μουσικός) συμβούλωι Πλάτωνι χρησάμενος,[3] πηκτιδας, σαμβύκας, καὶ ψαλτήρια πολύφθογγα καὶ βαρβίτους[4] καὶ τρίγωνα παραπέμψας τὴν λύραν καὶ τὴν κιθάραν προτιμήσει.

5. Varro, *ap. Non.*, III, 249.

Scientia doceat quem ad modum in psalterio extendamus nervias.

6. Cicero, *Har. Resp.*, 21.

P. Clodius, a crocota, a mitra, a muliebribus soleis, purpureisque fasciolis, a strophio, a psalterio, a flagitio, a stupro, est factus repente popularis.[5]

7. Virgil, *Ciris*, 177.

Non arguta sonant tenui psalteria chorda.

8. Quint., *Inst. Or.*, I, x, 31.

Apertius....profitendum puto, non a me praecipi.... psalteria et spadicas, etiam virginibus probis recusanda.

9. Macr., *Sat.* II, 10, citing Scipio Africanus.

Docentur (sc. pueri) praestigias inhonestas, cum cinaedulis et sambuca, psalterioque eunt in ludum histrionum.

10. Arnobius, VI, p. 209.

Deum mater cum tympano, cum tibiis et psalteriis Musae.[6]

[3] Plato, *Rep.*, p. 399 *c*:

Τριγώνων ἄρα καὶ πηκτίδων καὶ πάντων ὀργάνων ὅσα πολύχορδα καὶ πολυαρμόνια, δημιουργὸς οὐ θρέψωμεν . . . λύρα δή σοι καὶ κιθάρα λείπεται.

[4] Of the nature of the βάρβιτος, nothing certain is known. The word, according to Strabo (X, 471), is foreign. It may be noted that *barbut* is the common Persian word for a harp. (Cf. J. Richardson, *Dictionary of English, Persian and Arabic.*)

[5] Cf. Cic., *Frag. ap. Non.*, VI, 98:

"Tu vero festivus, tu elegans, tu solus urbanus, quem decet muliebris ornatus, quem incessus psaltriae....." The reference is to the sacrilege of Clodius, who disguised as a music-girl, invaded the sanctuary of the Syrian *Bona Dea*. Cf. also Juv., VI, 337.

[6] In addition, there is an obscure reference in Wisdom, which may here be cited:

ὥσπερ ἐν ψαλτηρίωι φθόγγοι τοῦ ῥυθμοῦ τὸ ὄνομα διαλλάσσουσι, παντότε μενόντα ἦχω . . . (XIX, 18).

the decadent Orientalized Greeks of his day[16] and were pronouncedly anti-Semitic.[17] There is no evidence whatever to show that it was the same as the nebel of the Hebrews.[18] The limit of inaccuracy is reached by Winer, whose definition may be cited as a curiosity:

"Psanterin oder psanterin, (Gesen., *Thes.* II, 116 et seq., Dan. iii. 5 ff., griech. ψαλτήριον) welches Wort im engern und bestimmtern Sinne ein citherähnliches Instrument (Lamprid., *Al. Sever.*, 27) bezeichnet, das mit beiden Händen gespielt wurde und μάγαδις hiess. (Athen., 14, 636)."[19]

The first reference is false,—neither ψαλτήριον nor *psalterium* is anywhere mentioned by Lampridius.[20] Athe-

[16] Cf. Tacitus, *Hist.*, V, 8: "Rex Antiochus, demere superstitionem et mores Graecorum dare adnisus, quo minus teterrimam gentem in melius mutaret, Parthorum bello prohibitus est."

[17] His attitude in persecuting the Jews was not because of their religion, but because they would not submit to Hellenizing influences.

[18] The word *nebel* passed into Greek, νάβλα, ναῦλα, first used by Sophocles (*Frag.* 760; ap. Plut., *Mor.*, 394 *b*).

οὐ ναῦλα κωκυτοῖσιν, οὐ λίρα φίλα,

and Latin *nablium, naula.* Originally it seems to have been applied to a wind instrument:

Πόσωι δὲ κρεῖττον, ὦ Οὐλπίανε σοφώτατε, τὸ ὑδραυλικὸν τοῦτο ὄργανον τοῦ καλουμένου νάβλα, ὃν φησι Σώπατρος ὁ παρωιδὸς ἐν τῶι ἐπιγραφωμένωι δράματι Πύλαι, Φοινίκων εἶναι καὶ τούτων εὕρημα. λέγει δ' οὕτως . . . ἐν Μυστάκου δὲ Θητίωι . . .

νάβλας ἐν ἄρθροις γραμμάτων οὐκ εὐμελής,
ὡι λωτὸς ἐν πλεύροισιν ἀψυχος παγείς,
ἐμπνουν ἀνίει μοῦσαν. (Ath. *Deipn.*, p. 175 *c.*)

Yet in the Old Testament it is always the name of one of the two common stringed instruments of the Jews, the other being *kinnor.* Cf. the testimony of Josephus:

ἡ μὲν κίννυρα (cf. LXX, Sam. xvi, 23, kinnôr, κινύρα) δέκα χορδαῖς ἐξημμένη, τύπτεται πλήκτρωι, ἡ δὲ νάβλα, δώδεκα φθόγγους ἔχουσα, τοῖς δακτύλοις κρούεται. (*Ant. Iud.*, VII, 12, 3.)

The statement of Ovid is equally accurate:

"Disce etiam duplici genialia nablia palma
Vellere, conveniunt dulcibus illa modis." (*Ars. Am.*, III, 327.)

It is not to be supposed that the *nebel* of Josephus's time differed from the ten-stringed *nebel* of Ps. xxxiii. 22, in other way than in the number of strings.

[19] G. B. Winer, *Biblisches Realwörterbuch*, Vol. II, p. 123.

[20] Lampridius, *Alexander Severus*, 26: "Lyra, tibia, organo cecinit."

νάβλα· εἶδος ὀργάνου μουσικοῦ, ἢ ψαλτήριον, ἢ κιθάρα, and of Suidas,

ψαλτήριον· ὄργανον μουσικὸν, ὁ καὶ ναῦλα καλεῖται,[12] wherefore the identity of *psanterin* and *nebel* has come into acceptance as a matter of course. Already in the seventeenth century, however, it is disputed by Abraham di Porta Leone, whose definition may be put in evidence:

"Scitote Pesanterin Graece et Latine appellari salterium, et est instrumentum simile scuto quadrato, constans decem chordis, quibus impositum est lignum vacuum in quod ingreditur sonitus pulsationis chordarum cuius causa eius pulsatio procul auditur, et hoc non erat nebel, sicuti multi putarunt, sed erat instrumentum illo inferius et deterius."[13]

The value of his testimony consists not in that he describes the probable form of the psanterin, but that he preserves an evident unrecorded tradition to the effect that the nebel and the psanterin were different instruments.

So far the evidence goes to show that the Greeks were acquainted with an instrument called ψαλτήριον, the same word, in the Aramaic *psanterin*, being known to the author of the book of Daniel, as the name of a musical instrument played by one of a band of musicians[14] at the court of Antiochus Epiphanes,[15] whose tastes coincided with those of

[12] These definitions based on LXX usage, are to be discounted, as of no value.

[13] *Shilte haggibborim*, Ugol. Thes., vol. XXXII, col. lviii.

[14] These musicians were no doubt of the class frequently referred to by Greek and Latin writers—they were a caste apart— of loose morals, who from the fourth century B. C. became common throughout Greece and Rome, as public and private entertainers. Cf. Macrobius, *Sat.* II, 1, 5: "Sub illorum ....supercilio non defuit, qui psaltriam intromitti peteret, ut puella ex industria supra naturam mollior, canora dulcedine et saltationis lubrico exerceret illecebris philosophantes." Cf. also Livy, XXIX, 6, and Aur. Vict., *loc. cit.*; see note 10. In the Orient to-day is a similar class; with few exceptions, all are Gypsies, as the Luri of Egypt.

[15] It cannot be merely a coincidence that the bagpipe, referred to in Dan. iii. 5, etc., should be twice mentioned by Polybius (XXVI, 1; XXX, 26) as a favorite instrument with Antiochus.

a few words may be said. The name is of foreign origin,[25] as indeed, according to Aristoxenus,[26] the instrument was acknowledged to be. As to its identity citations from various authors are given by Athenæus.[27]

Athenæus, *Deipnosophistae*, p. 634 *c*.

ὁ μὲν γὰρ ἥδιστος Ἀνακρέων λέγει που,
ψάλλω δ' εἴκοσι χορδαῖσι μάγαδιν ἔχων.

Ibid., p. 635 *a*.

Εὐφορίων δὲ ἐν τῶι περὶ Ἰσθμίων,[28] παλαιὸν μέν φησι τὸ ὄργανον εἶναι τὴν μάγαδιν, μετασκευασθῆναι δ' ὀψέ ποτε, καὶ σαμβύκην μετονομασθῆναι.[29]

Ibid., p. 635 *b*.

[25] Strabo, X, 471:

Καὶ τῶν ὀργάνων ἐνια βαρβάρως ὠνόμασται, νάβλας καὶ σαμβύκη, καὶ βάρβιτος καὶ μάγαδις καὶ ἐνια πλείω.

[26] Ἀριστόξενος δ' ἐκφυλα ὀργανα καλεῖ φοίνικας καὶ πηκτίδας, καὶ μαγάδιδας, σαμβίκας τε καὶ τρίγωνα καὶ κλεψιάμβους καὶ σκινδαψοὺς καὶ τὸ ἐννεάχορδον καλούμενον. (Ath. *Deipn.*, p. 182 *f*.)

[27] An archaic wind instrument, giving forth two sounds at once, not unlikely a primitive form of bagpipe, called *μάγαδις*, is referred to by Athenaeus, *Deipn.*, p. 182 *d*:

ὁ δὲ μάγαδις αὐλὸς καλούμενος, ὁ καὶ παλαιομάγαδις ὀνομαζόμενος, ἐν ταυτῶι ὀξὺν καὶ βαρὺν φθόγγον ἐπιδείκνυται, ὡς Ἀναξανδρίδης ἐν Ὁπλομάχωι φησιν.

μάγαδι λαλήσω μικρὸν ἅμα σοι καὶ μέγα.

Elsewhere he attempts to show that no such instrument existed. The fact remains, however, that a rude bagpipe-like instrument, made of a gourd, into which are inserted three pipes, a chanter and two drones, is played upon by snake charmers of Ceylon, and called by them *magoudi*.

[28] Euphorion, an epic poet, born 274 B. C.

[29] Suidas *ζαμβύκη, ιαμβύκη, σαμβύκη*, according to Strabo (note 25) a loan-word in Greek. Also in Aramaic, in the form sabbeka, with *w*, (cf. Dan. iii. 5, etc., LXX *σαμβύκη*, Vulg. sambuca). Of the instrument itself, the following is known:

Περὶ σαμβύκης ἐφη ὁ Μασσύριος ὀξύφθογγον εἶναι ὄργανον τὴν σαμβύκην . . . χρῆσθαι φήσας αὐτῶι Πάρθους καὶ Τρωγλοδύτας, τετραχόρδωι ὄντι. (Ath. *Deipn.* p. 633 *f*.)

Τὴν δὲ σαμβύκην . . . μετὰ πολλῆς ὀξύτητος διὰ τὴν μικρότητα τῶν χορδῶν . . . (Aristides Quintilianus, p. 101, *Meibom.*)

Sambuca triangulum instrumentum est, quod ex inaequalibus longitudine et crassitudine nervis efficitur. (Porph., in *Ptol. Harm, ap. Forcellini, s. v.* "sambuca.") It was most probably a very small triangular harp. In the fourth century B. C. it was introduced into Greece by professionals from the East,—later into Rome. (Cf. Livy, XXXIX, 6.)

Μεναίχμιος δ'[30] ἐν τοῖς περὶ Τεχνίτων, τὴν πηκτίδα, ἣν τὴν αὐτὴν εἶναι τῇι μαγάδιδι, Σαπφώ φησιν εὑρεῖν.[31] Ἀριστόξενος δέ, τὴν μάγαδιν καὶ τὴν πηκτίδα χωρὶς πλήκτρου διὰ ψαλμοῦ παρέχεσθαι τὴν χρείαν, διόπερ καὶ Πίνδαρον εἰρηκέναι ἐν τῶι πρὸς Ἱέρωνι σκολίωι, τὴν μάγαδιν ὀνομάσαντα ψαλμὸν ἀντίφθογγον, διὰ τὸ διὰ δύο γενῶν ἅμα καὶ διὰ πασῶν ἔχειν τὴν συνωιδίαν ἀνδρῶν τε καὶ παίδων.[32]

It appears from the above that the μάγαδις, the Greek name of which was πηκτίς, was a peculiar instrument, played with the fingers only, having twenty strings, tuned in parallel octaves. It is probable, however, that only ten were picked, the remainder acting as sympathetic strings. The following reference seems clearly to support this view: Σώπατρος ὁ παρωιδὸς, ἐν τῆι ἐπιγραφομένωι Μυστάκου Θητιώι, δίχορδον[33] εἶναί φησι τὴν πηκτίδα, λέγων οὕτως,—

[30] Menaechmius of Secyon, according to Suidas, lived in the time of the successors of Alexander.

[31] Πηκτὶς δὲ καὶ μάγαδις ταὐτὸν, καθὰ φησὶν ὁ Ἀριστόξενος καὶ Μεναίχμιος ὁ Σικυώνιος ἐν τοῖς περὶ Τεχνίτων. (Ath. *Deipn.* p. 635 *e.*)

[32] Cf. μαγαδίζειν, of men and boys singing the same melody.

[33] Cf. Hesychius,—πηκτίς·—πανδούριον, ψαλτήριον, σίριγξ, ὄργανον.

The lexicographer, having this citation in mind, misunderstood the epithet δίχορδος, in identifying the instrument with the πανδούριον. Of the latter instrument the following is known:

τρίχορδον, ὅπερ Ἀσσύριοι πανδούραν ὠνόμαζον. (Pollux, IV, 61.)

Πιθαγόρας δὲ, ὁ γεγραφὼς περὶ τῆς ἐρυθρᾶς θαλάσσης, τοὺς Τρωγλοδύτας φησι κατασκευάζειν τὴν πανδούραν ἐκ τῆς ἐν τῆι θαλάσσηι φυομένης δάφνης. (Ath. *Deipn.*, IV, p. 183.)

The word itself, found in Greek in the forms πανδούριον, πανδούρα, φάνδουρος, survives in the following derivatives:

Ital., pandora, mandola, mandolina. (Cf. Mod. Greek, μανδωλῖνον.)
Span., mandora, bandurria.
Cat., bandoli.
Port., bandurra.
Prov., mandola, mandoulino.
Roum., pandora, mandora, mandola.
Engl., pandore, bandore, banjo, mandolin.

It is applied to a variety of instruments based on the principle of the monochord,—lute, guitar, mandolin, etc. The principle was known to the Greeks,—ignorant persons called the monochord φάνδουρος. (Nic. *Ench.*, p. 243, Jan.) Representations of a lute-like instrument appear in late Greek sculpture (cf. Theodore Reinach, "La guitarre dans l'art grec," in *Rev. des Et. Gr.*, VIII, p. 374). This is most probably the πανδούρα.

Πηκτὶς δὲ Μούσηι γαυριῶσα βαρβάρωι
δίχορδος εἰς σὴν χεῖρά πως κατεστάθη.[34]

That the *μάγαδις* should have been confounded with two instruments so evidently different, from each other at least, as the *ψαλτήριον* and the *σαμβύκη*,[35] is a fact to be traced to the existence of some feature common to all these exotic instruments, which would attract the attention of the casual observer.

The Greek national instrument was the lyre. Harps of several types were introduced from the East as early as the fifth century B. C.,[36] by professional musicians,[37] and met with favor among the fashionable classes, though disliked by Plato[38] and indeed by all philosophers and teachers of Greek music. From its name it is evident that the *ψαλτήριον* was played with the fingers only, as were also the *μάγαδις* or *πηκτίς*, the *νάβλα*, the *τρίγωνον*, and probably the *σαμβύκη*. In view of this fact it is clear that

[34] Ath. *Deipn.*, p. 183 *b*.

[35] In Dan. iii. 5, etc., they are mentioned together,—karna, mashrokitha, kitharos, *sabbeka, psanterin,* sumponyah.

[36] The word for "harp" among the ancient Greeks was *τρίγωνον*, mentioned by Plato, *Rep.* 399 *c*). Concerning this instrument, the following facts are worthy of record here:

Καὶ τὸ τρίγωνον δὲ καλούμενον ὄργανον Ἰάβας ἐν τετάρτωι θεατρικῆς ἱστορίας, Σίρων εὕρημά φησιν εἶναι . . . . Ἀλέξανδρος δὲ ὁ πολίτης μου . . . . δημοσίαι ἐπιδεικνύμενος ἐν τῶι τριγώνωι ἐπικαλουμένωι ὀργάνωι, οὕτως ἐποίησε πάντας Ρωμαίους μουσομανεῖν, ὡς τοὺς πολλοὺς καὶ ἀπομνημονεύειν αὐτοῦ τὰ κρούσματα. (Ath. *Deipn.*, p. 175 *d*; 183 *e*.)

Οἱ γε τοὶ παλαιοὶ τὸ τρίγωνον ἐξ ἀνίσων τοῖς μεγέσι χορδῶν ἐποίουν, μακροτάτης μὲν τῆς πασῶν ἐξυπάτου, ἐπομενεστέρας δὲ ταύτης τῆς πλήκτρου, τῶν δ' ἔτι ἐνδοτέρω καὶ πρὸς τῆι γωνίαι τοῦ ὀργάνου καθημένων κολοβώτερον τοῖς μεγέσιν. (Ptol. *Harm.*, p. 216.) Cf. also Aristotle, *Probl.* XIX, 23.—ἐπὶ καὶ ἐν τοῖς τριγώνοις (ψαλτηρίοις) τῆς ἴσης ἐπιτάσεως γινομένης, συμφωνοῦσι διὰ πασῶν, ἡ μὲν διπλασία οὖσα, ἡ δὲ ἡμίσεια τῶι μήκει. The word ψαλτηρίοις is a gloss, and should be stricken from the text.

[37] Εὐφορίων δὲ ὁ ἐποποιός, ἐν τῶι περὶ Ἰσθμίων, οἱ νῦν, φησιν, καλούμενοι ναύβλαι, καὶ πανδουρισταί, καὶ σαμβυκισταί, κανοῦν μὲν οὐδὲν χρῶνται ὀργάνωι . . . . τὴν μάγαδιν καὶ τὰ τρίγωνα, καὶ τὰς σαμβύκας ἀρχαῖα εἶναι . . . . (Ath. *Deipn.*, p. 182 *e*.)

[38] Cf. Plato, *Rep.* 399 *c*:

τριγώνων ἄρα καὶ πηκτίδων καὶ πάντων ὀργάνων ἅπτα πολύχορδα καὶ συναρμόνια, ἁρμονιῶν αὖ θρήνων . . . . λύρα δὴ καὶ κιθάρα σοι λείπεται.

Plato's Greek exclusiveness, together with the evil reputation of Oriental musicians, partly explains the Greek dislike of the harp.

the confusion of names is a simple matter of semasiology, —the least definite name, ψαλτήριον, following the law of extension of meaning, became applied indiscriminately to a number of stringed instruments of the harp-type. Accordingly in the LXX, ψαλτήριον, though not an exact equivalent, was used to render nebel.[39] It is to be noted, however, that St. Jerome, who usually follows the LXX, sometimes, instead of *psalterium*, retains *nablum*.[40]

As was the case with κίθαρις[41] and συμφωνία, the word ψαλτήριον has wandered far, passing at an early date eastward into Aramaic, and westward into Latin. To-day it is widely current, appearing in different languages in many different forms, as the name of both the psaltery and the dulcimer. The following table will give an idea of the extent of its migrations:

Greek, ψαλτήριον.

Aramaic, psanterin, Syriac, santir.
Arabic, santir, santur.
Pers., santir, santur,
Armen., santur,
Modern Greek, σαντῶρ,[42]
Turk., santur,
Albanian, samtur.[43]
Bulgarian, santyra.

[39] The definitions of the Church Fathers, both Greek and Latin, of ψαλτήριον and psalterium, are to be discounted, as referring not to the Greek ψαλτήριον, but to the Hebrew nebel.

[40] As in I Paral., XV, 16, 20. Cf. Pseudo-Mamotrectus, *ad I Paral.*, XIII, 8: "Psalterium dicitur canora cythara decem chordarum coaptata, quae plectro percutitur, nablum vero duodecim sonos habens, digitis tangitur." The commentator had in mind the medieval psaltery, and understood nebel, (*nablum*) as the name of a harp.

[41] Pers., *sitar*; Germ., *Zither*; Ital., *cetera*; Engl., guitar.

[42] For this fact I am indebted to Mr. A. T. Sinclair, author of *Gypsy and Oriental Musical Instruments.*

[43] G. Meyer *Etymologisches Wörterbuch der albanesischen Sprache*: "Samtur,—ein Saiteninstrument, decacordo."

Latin, psalterium, Ital., salterio,
Span., salterio,[44]
Cat., salteri,
Port., salterio,
Prov., psalteri, psautier,
salteri, sauteri, sautiri,
O. Fr., psaltere, saltere,
sautere, sauterie,[45]
Old Engl., sawtrie,[46]
Engl., psaltery.

In conclusion, it may be said that the evidence of the Greek and Latin writers, as has been shown, points toward the identification of the ψαλτήριον and psalterium, as a kind of horizontal harp, a primitive ancestor of the instruments to-day called by names which are derivatives of the Greek word ψαλτήριον.[47] The modern psaltery and dulcimer[48] represent the results of technical and structural evolution[49] along different lines, from the simple primitive instrument,—the final stage in the course of evolution being the harpsichord and the piano.

[44] The psaltery is pictured twice in the 13th century Spanish manuscript, *Loores et Milagros de Nuestra Senora.* See Juan F. Riano, *Notes on Early Spanish Music,* pp. 112, 118.

[45] Now extinct,—the modern word is *psalterion.*

[46] Chaucer, "The Miller's Tale":

"And all above ther lay a gay sawtrie,
On which he made on nightes melodie."

[47] In the East, generally of the dulcimer, the psaltery being called *kanun.* In the West, generally of the psaltery, the dulcimer having various local names: Ital., *cembalo*; Fr., *tympanon*; Ger., *Hackebrett*; Hung., *czimbalom.*

[48] Grove, *Dictionary of Music, s. v.* "dulcimer": "These instruments were so nearly alike, that one description might serve for both, were it not for the different manner of playing them,—the strings of the dulcimer being set in vibration by small hammers held in the hands, while in the psaltery the sounds were produced by plectra of ivory, metal or quill, or even the fingers of the performer."

[49] How early this evolution began is not known. The Assyrians had the dulcimer, but there is no evidence that Hebrew or Greek of ancient times had it.

Accordingly the rendering of the English A. V., in Dan. iii. 5, 7, 10, 15, namely, psanterin: "psaltery," is to be retained. The first passage then should read:

"That at what time ye hear the sound of the trumpet, pipe, lyre,[50] harp, psaltery, bagpipe and all kinds of music, ye fall down and worship the golden image...."

Elsewhere in the Old Testament, as in 1 Chron. xiii. 8, where the Hebrew word is nebel, the rendering "psaltery" of the English A. V. is to be replaced by "harp."[51]

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[50] *Kitharos*, κίθαρις, is used in Dan. iii. 5, etc., of the Greek lyre.

[51] Similarly, "lyre" should be read in place of English A. V., "harp,"—standing for the Hebrew *kinnor*, as in 1 Sam. xvi. 23.

THE SAYINGS OF JESUS IN THE TALMUD.

WE have noticed two sentences which are handed down in the Talmud as sayings of Jesus. One at least is expressly quoted as a saying of Jesus. We refer to the section, headed "Jacob the Teacher." It must be surprising that in such a bulky work as the Talmud, no more should be found. Thus it may seem. But it is not so. There are numerous sentences in the Talmud which are ascribed to Jewish authorities, but which belong to Jesus. This, Jewish writers will not admit. They claim, and with them writers like Renan, that the Talmud or the rabbis were copied by Jesus. Said Renan (*Life of Jesus*, p. 108): "It is sometimes supposed that the compilation of the Talmud being posterior to that of the Gospels, appropriations might have been made by the Jewish compilers from the Christian morality. But that is inadmissible." That Renan is mistaken, we shall see. A better authority than the French writer is the late Dunlap Moore, for many years a missionary among the Jews. In his article "Talmud" in the *Schaff-Herzog Encyclop.* he says: "It is admitted that the Talmud has borrowed from the neighbors of the Babylonian Jews superstitious views and practices notoriously contrary to the spirit of Judaism. Why, then, may it not have appropriated Christian sentiments too?"

Canon Farrar in *Life of Christ*, II, 485 says: "Some excellent maxims—even some close parallels to the utterances of Christ—may be quoted, of course from the Talmud,

where they lie embedded like pearls in a sea of obscurity and mud. It seems to me indisputable that these are amazing few, considering the vast bulk of national literature from which they are drawn. And, after all, who shall prove to us that these sayings were always uttered by the rabbis to whom they are attributed? Who will supply us with the faintest approach of a proof that (when not founded on the Old Testament) they were not directly or indirectly due to Christian influence or Christian thought?" Wellhausen (*Israelitische und jüdische Geschichte*, 1894, p. 37 note) remarks: "The Jewish scholars think that everything that Jesus said is also in the Talmud. Yea, everything and *still more*. How was he able to find out the true and eternal from this rubbish of scribism? Why did no one else do it? And is it certain when a saying is ascribed in the Talmud to Rabbi Hillel, that the Talmud is right? Could not a Gospel word have found its way into the Talmud and sail there under false colors? That the Talmud is mainly founded upon oral tradition is a mere superstition; it is based on literature and refers to literature."

We must not overlook the fact that Jesus preached to the multitudes wherever the opportunity was offered, and it was very natural, not only that his fame spread everywhere, but also that those who heard him spread his sayings, so that they became the common property of all. Not so the Talmudic sage and proud Pharisee, who never mingled with those who were outside of his circle. Nor must it be forgotten, that the number of those who followed Jesus was not so small as is generally believed; it is estimated too low, because the followers are so grouped together that their individual numbers do not attract our notice. But with the New Testament in our hand, we find a different result. It is therefore but natural to assume that believing Christians were the means of spreading, if not the Gospels as such, at least the sayings of Jesus. But the Gospels were

circulated at a very early period, as we learn from the enactments of the rabbis against them.

At the time that the rules for keeping the Sabbath were under consideration, it was asked in the schools whether, if the Gospels and other books of the Christians should happen to fall into the fire, it would be permissible to rescue them from the fire, inasmuch as the name of God was written in them and they contained numerous quotations from the Old Testament. "The Gospels and the other books of the Christians are not to be rescued from the fire;" such is the verdict (Shabbath, fol. 116, col.1); and Rabbi Aqiba, who hailed Barcochba as the Messiah, laid it down as an injunction that whosoever read in outside books, i. e., books of the Christians, has no portion in the world to come (Sanhedrin, fol. 100, col. 2).

All this proves that the Gospels were in circulation; otherwise we can not understand the precautions against them. Such being the case, we can also understand the origin of the sayings in the Talmud which are generally adduced as proof that the New Testament borrowed from the Talmud.

That the Gospels were read by the sages of Israel is also corroborated by the fact that Hillel II, a descendant of the famous Hillel, was secretly baptized on his deathbed by a bishop. This statement is made by Epiphanius (*Haeres.* C. XXX), himself a convert from Judaism, on the authority of Joseph, Hillel's physician, who was a witness to the scene by which he was strongly impressed. The house of Hillel, or Ellel as Epiphanius writes, was kept closely shut after his death by his suspicious countrymen at Tiberias. Joseph obtained entrance and found the Gospel of St. John, the Gospel of St. Matthew, and the Acts in a Hebrew translation. He read, believed, and was publicly baptized; he rose high in the favor of Constantine, attaining the dignity of Count of the Empire. Burning

with zeal, he turned all his thoughts to the establishment of Christian churches in the great Jewish cities. Joseph, who endured much from the Jews and the Arians, is commemorated in the *Roman Martyrology* as a confessor on July 22.

Renan's notion found a supporter in the Jewish writer E. Deutsch of the British Museum, who makes the following statement in his article on "The Talmud" published in *The Quarterly Review* (October 1867): "We need not urge the priority of the Talmud to the New Testament... To assume that the Talmud borrowed from the New Testament would be like assuming that Sanscrit sprang from Latin, or that French was developed from the Norman words found in English."

All this sounds very nice, and so do many other things which Deutsch tells his readers in that article on "The Talmud."[1] But how it is possible that sayings attributed in the Talmud to rabbis who lived a long time after Jesus should have been borrowed by the latter, these Jewish writers do not explain. These writers pay no attention to the name of the author to whom a saying is attributed, or the time in which he lived. They are satisfied with the mere fact that it is in the Talmud. We shall not follow this bad example. From the date added to each rabbi's name, the impartial reader will be enabled to judge whether Jesus borrowed from the Talmud, or *vice versa*.

As the "Sermon on the Mount" is regarded as the most ethical part of the New Testament we will quote it with the so-called Talmudic parallels.

1. *Jesus*: "Blessed are the poor in spirit, for theirs is the kingdom of heaven" (Matt. v. 3).

Rabbi Levitas of Jabneh (2d cent.): "Ever be more

[1] For a refutation of Deutsch's assertion, see my article "Talmud" in McClintock and Strong's *Cyclop.*

and more lowly in spirit, since the expectancy of man *is* to become the food of worms" (Aboth 4, 4).

This saying, Edersheim (*Life and Times of Jesus*, I, p. 532) says, is exactly opposite in spirit, marking not the optimism, but the pessimism of life.

Rabbi Joshua ben Levi (A. D. 219-279): "Behold how acceptable before the Lord are the humble. While the temple stood, meat-offering and sacrifices were offered in expiation for sins committed; but a humble spirit, such a one as immolates the desires of the flesh and the inclination of the heart on the altar of his duty to his God, is acceptable in place of sacrifices, as the Psalmist says (Ps. li. 19): The sacrifices of God are a broken heart. (Sanhedrin, fol. 43, col. 2.)

But nothing is said of "the kingdom of heaven," which Christ promised to all men! The contrast is too great to believe that the teaching of Jesus was derived from Jewish sources. And, says Edersheim: "It is the same sad self-righteousness and utter carnalness of view which underlies the other Rabbinic parallels to the Beatitudes, pointing to contrast rather than likeness. Thus the Rabbinic blessedness of mourning consists in this, that much misery here makes up for punishment hereafter (Erubin, fol. 41, col. 1). We scarcely wonder that no Rabbinic parallels can be found to the third Beatitude, nor to the fourth, to those who hunger and thirst after righteousness."

2. *Jesus*: "Blessed are the merciful, for they shall obtain mercy" (Matt. v. 7).

Beribbi (3d cent.): "He who is merciful toward his fellow creatures shall receive mercy from heaven above; but he who is unmerciful toward his fellow creatures shall find no mercy in heaven" (Shabbath, fol. 151, col. 2).

3. Jesus: "Blessed are they which are persecuted for righteousness' sake, for theirs is the kingdom of heaven" (Matt. v. 10).

Rabbi Abahu (A. D. 279-310): "Be rather one of the persecuted than of the persecutors" (Baba Kamma, fol. 93, col. 1).

4. *Jesus*: "Whosoever shall break one of these least commandments, and shall teach," etc. (Matt. v. 19).

Rabbi (A. D. 190): "Be equally attentive to the light and to the weighty commandments" (Aboth 2, 1).

Ben Azaï (about 100-130 A. D.): "Be prompt in the performance even of a light precept" (*ibid.* 4, 2).

The rabbis were in the habit of making a distinction in the commandments, between such as they called *light* and others which they charcterized as *weighty*. Jesus viewing the law of Moses in its whole extent, recognized this distinction, though differing entirely from the rabbis as to what constituted the lighter and what the weightier commandments: "Woe unto you, scribes and Pharisees, hypocrites! for ye pay tithe of mint and anise, and cummin; and have omitted the weightier matters of the law, judgment, mercy, and faith. These ought ye to have done, and not to leave the other undone" (Matt. xxiii. 23).

5. *Jesus*: "But I say unto you, that whosoever is angry with his brother without a cause shall be in danger of the judgment," etc. (Matt. v. 29).

Resh Lakesh (A. D. 212-280): "Whosoever lifts up his hand against his neighbor, though he do not strike him, is called an offender and sinner" (Sanhedrin, fol. 98, col. 1).

6. *Jesus*: "Leave thy gifts before the altar, and go thy way; first be reconciled," etc. (Matt. v. 24).

Rabbi Eleazar ben Azariah (about 100 A. D.): "The transgression which a man commits against God, the Day of Atonement expiates; but the transgression which he commits against his neighbor, it does not expiate, unless he has satisfied his neighbor" (Yoma, VIII, 2).

7. *Jesus*: "But I say unto you, that whosoever looketh

on a woman to lust after her, committeth adultery," etc. (Matt. v. 28).

Rabbi Shesheth (A. D. 285): "Whosoever looketh on the little finger of a woman with a lustful eye is considered as having committed adultery" (Berachoth, fol. 24, col. 1).

8. *Jesus*: "But let your communication be Yea, yea; Nay, nay" (Matt. v. 37).

Rabbi José berabbi Jehudah (A. D. 100-170) explains: "What is the meaning of Lev. xix. 36 'just balances, just weights, a just ephah, and a just hin,' since a hin was included in the ephah? To teach that your yea be yea, and your nay be just." Abbaye (died 338 A. D.) says: "This means that one should not say one thing with the mouth and another with the heart" (Baba Mezia, fol. 49, col. 1).

Every right-minded person will subscribe to Abbaye's dictum, but theory is one thing and practice another. At a meeting held at Lydda and presided over by Aqiba and Tarphon, decrees were enacted that a man might break the law in all points save those of idolatry, incest and murder, in order to save his life. But even on these three points some latitude was given, and Rabbi Ishmael declared it lawful in cases of extreme necessity even to simulate compliance with heathen practices. In this way was systematized the principle of mental reservation, which enabled a man to take an oath which he never meant to keep. As an instance the Talmud (Yoma, fol. 84, col. 1; also Aboda Zara, fol. 28, col. 1) tells us with great complacency the following story of Rabbi Jochanan: "He went to a woman to be cured of a toothache. He saw her on Thursday and Friday. Then he said, 'What shall I do to-morrow' (for he had to preach)? She said, 'You won't want it' (i. e., the remedy). He: 'But suppose I do want it?' She: 'I will tell you the secret if you swear not to reveal.' Then he swore, '*Lalaha* of Israel I will not reveal it' (this she could only understand to mean: 'By the God of Israel, I will not

reveal it'). Then she told the secret, and the next day he revealed it to the congregation. But how could this be? since he had sworn her an oath? He had sworn *Lalaha* of Israel—i. e., 'To the God of Israel I will not reveal it, but I will reveal it to the congregation of Israel." But was not this profaning the name of God (inasmuch as she would think he had committed perjury)? No, for he told her at once (i. e., when he had got the recipe he told her that he had sworn *lalaha,* not *balaha,* and the oath would not hold)."

Of Rabbi Aqiba a like instance is narrated (Kalla, fol. 18, col. 2) with the remark that he swore with his lips, but made the oath void in his heart (see above I C, 2).

9. *Jesus*: "And if any man will sue thee at the law, and take away thy coat, let him have the cloak also" (Matt. v. 40).

Rabba (A. D. 320-363) to Rabba the son of Mar: "How is that popular saying: If any one ask for thy ass, give him the saddle also?" (Baba Kamma, fol. 92, col. 2).

10. *Jesus*: "Bless them that curse you" (Matt. v. 44).

Rabbi Jehudah (A. D. 120): "Be rather of the accursed than of those that curse" (Sanhedrin, fol. 98, col. 2; 99, col. 1).

11. *Jesus*: "Take heed that ye do not your alms before men, to be seen of them" (Matt. vi. 1).

Rabbi Yanaï (A. D. 120) to a man who gave alms in such a public manner: "You had better not give him anything; in the way you gave it to him you must have hurt his feelings" (Chagiga, fol. 5, col. 1).

12. *Jesus*: "Our Father which art in heaven" (Matt. vi. 6).

This expression which is found twice[2] in the Mishna (Yoma 8, 9 and Sotah 9, 15) is certainly taken from the

[2] Or rather once, viz., Sotah, 9, 15, for in the other passage we read: "Your father which is in heaven."

New Testament, since the two rabbis who use this phrase lived after the destruction of the Temple.

As to the Lord's Prayer in general, Geikie (*Life and Words of Christ,* II, p. 619) states that Gfroerer, who took special pains to search for the Lord's Prayer in the Talmud, found that it could not be traced in any measure to older Jewish sources."

Edersheim (*loc. cit.,* I, p. 536) says: "It would be folly to deny that the Lord's Prayer, in its sublime spirit, tendency, combination and succession of petitions is unique; and that such expressions in it as 'Our Father,' 'the kingdom,' 'forgiveness,' 'temptation,' and others, represent in rabbinism something entirely different from that which our Lord had in view."

The Jewish writer Hamburger in his *Real-Encyclopädie für Bibel und Talmud* (3d suppl., Leipsic, 1892, article "Evangelien," i. e., Gospels, p. 54), says: "Each (!) sentence of this prayer (i. e., the Lord's Prayer) occurs in the prayers and teachings of the Jewish teachers in the Talmud, so that the entire (!) prayer has its home on the soil of Judaism."

Hamburger overlooks the fact that prayers which are mentioned in the Talmud are not only later than the time of Jesus, but even aside from this, are vastly different from the petitions which Jesus taught. The Mishna, the oldest part of the Talmud, it is true, mentions the so-called *Shema,* which every Israelite was to repeat morning and evening. This *Shema,* i. e., "Hear, O Israel," which is made a kind of confession of faith, consists of the Pentateuch passages Deut. vi. 4-9; xi. 13-21; Num. xv. 37-41. Strange to say, though this prayer is taken from the Bible, yet women, slaves and children were not obliged to recite it (Mishna Berachoth, 3, 3). As to the other prayer, *the prayer,* or the *Shemoneh Esreh,*[3] i. e., Eighteen Eulogies or Bene-

[3] See my article "Shemoneh Esreh" in McClintock and Strong's *Cyclop.*

dictions, it belongs according to its present form to the time between 70-100 A. D., though it contains elements much older.

We are aware that there is an entire Talmudic treatise especially devoted to the subject of prayer, namely, the first of the Talmud, entitled "Berachoth." In this the exact position, the degree of inclination, and other trivialities, not referred to by Christ, are dwelt upon at length as of primary importance. In the same treatise we have also a number of prayers by different rabbis. Let any one take up this treatise, either in the German translation of Pinner or Goldschmidt, or in the French translation of Schwab, and he will find none which can compare with the Lord's Prayer. Take as an illustration the following: "Rab Shesheth [toward the end of the third century A. D.] when he had fasted, prayed: 'Lord of the world, it is evident before thee, that at the time that the sanctuary stood, a man sinned and brought an offering; nor did they offer of it any thing but its fat and its blood, and he was forgiven. And now I have continued fasting, and my fat and my blood have been diminished. May it please Thee, that my fat and my blood which have been diminished be as if I had offered them upon the altar, and be merciful to me' " (Berachoth, fol. 16, col. 2).

More interesting, because of its similarity to the Pharisee's prayer mentioned in the Gospel of Luke xviii. 9-14, is the following of Rabbi Nechunjah the son of Ha-Kanah, which he uttered upon leaving the school of learning: "I thank thee my God, that thou hast given me my portion among those who sit in the house of learning and not among those who sit at the corners of the street. For I rise up early, and they rise up early; I rise up early to occupy myself in things concerning the law, they rise up early to occupy themselves in things which are useless. I work and they work. I work and receive a reward, they

work and receive no reward. I run and they run. I run to everlasting life, and they run to the pit of destruction" (Berachoth, fol. 28, col. 2).

13. *Jesus*: "For if ye forgive men their trespasses, your heavenly Father will also forgive you" (Matt. vi. 14).

Rabba (died after 331 A. D.): "Whoever forgives the wrong done unto him, God will also forgive his sins" (Massècheth Dèrech èrez sutta, 8, 4).

14. *Jesus*: "Lay not up for yourselves treasures upon earth where moth and rust doth corrupt" etc. (Matt. vi. 19, 20).

In the Talmud (Jerusalem Peah 15*c*; Baba Bathra 11*a*) we read of Monobazus,[4] king of Adiabene on the Tigris, who with his mother Helena and his brother Izates became converts to Judaism. After wild exaggerations of his wealth, the narrative goes on to say that his brothers and friends came to him and said, "Thy fathers gathered treasures and added to the treasures of their fathers, but thou scatterest them." He answered, "My fathers had their treasures below, and I lay them up above; my fathers had their treasures where the hands [of men] may lay hold of them, I, where no hand can do so. My fathers' treasures yield no fruit, but I collect what gives fruit. My fathers stored away mammon, I, treasures of the soul; my fathers did it for others, I for myself. My fathers gathered them for the world, I, for the world to come."

A Jewish writer quoting what is said of Monobazus remarks with reference to Matt. vi. 19, 20: "The Talmud enjoins this moral more strikingly and practically by attributing it to the benevolent proselyte Munbaz (=Monobazus).—But who will vouch that the words put into the mouth of this proselyte from heathenism, were not the after-thought of some rabbi? Is it possible to imagine that Jesus should have heard of his supposed words and perused

[4] He was king in the year 61 A. D.

them at the beginning of his ministry? *Credat Judaeus Apella!*

15. *Jesus*: "Behold the fowls of the air, for they sow not, neither do they reap," etc. (Matt. vi. 26).

Rabbi Simon ben Eleazar (3d cent.): "Hast thou ever seen a beast or a bird that followed a trade, and yet they are fed without toil. But these were only created to minister to me, while I was created to minister to my Maker. Was it not right, then, that I should be supported without toil? But I have marred my work and forfeited my support" (Kidushin, fol. 82, col. 2).

The late Prof. Franz Delitzsch, in his *Jüdisches Handwerkerleben zur Zeit Jesu*,[5] quotes this passage in the following connection:

"A learned Jew of the British Museum, Emmanuel Deutsch, published in 1867, in *The Quarterly Review*, an article on the Talmud, in which he endeavored to show that between Judaism and Christianity no such wide difference exists as is generally believed, since most of the pithy sayings and parables of the New Testament are not to be regarded as the original property of Christianity. The impression produced by this essay was all the deeper, the less able most of the readers were to compare the New Testament with this its glorification.... It would be very easy to demonstrate that the author has no idea of the essence of Christianity,.... that the records of Christianity are much older than their Talmudic parallels."

After quoting the above passage from the Talmud, together with Matt. vi. 26, Delitzsch goes on: "Herr Deutsch draws many such parallels, avoiding with a proud air the question of priority, as if it could not be raised at all. For when did this Simon live? He lived in the time of Emperor Hadrian, full nigh a century later than Jesus! We will

[5] English translation by B. Pick, *Jewish Artisan Life*, New York: Funk & Wagnalls, 1882, p. 23.

not, of course, insist on that account that he had drawn his maxim either direct from the Gospel of St. Matthew, which was current in the Hebrew language, or indirectly from Christian lips; but if there is such a real coincidence, it is evident here, as in almost every other case, that the saying of Jesus is the original, and that of Simon the copy. We say in *almost* every other case, but we might just as well say in *all* cases; for with the exception of Hillel, all Talmudic teachers whose maxims correspond to the words of the New Testament are of a far later date than Jesus and the records of Christianity.[6]

16. *Jesus*: "Therefore take no thought saying, What shall we eat? or what shall we drink?" etc. (Matt. vi. 31-34).

Rabbi Eliezer (died A. D. 117)[7] says: "He who still has bread in the basket, and saith, What shall I eat tomorrow? belongeth to those of little faith" Sotah, fol. 48, col. 2).

17. *Jesus*: "For with what judgment ye judge. ye shall be judged" (Matt. vii. 2).

The *post-Mishnaic* teachers said: "He that judges his neighbor charitably, is himself judged charitably" (Shabbath, fol. 127, col. 2).

18. *Jesus*: "With what measure ye mete, it shall be measured to you again" (Matt. vii. 2).

Rabbi Meïr[8] (2d cent.): "With what measure a man metes it shall be measured to him from heaven" (Sanhedrin, fol. 100, col. 1).

[6] These words are the more important because they come from a scholar who understood the Talmud better than did Deutsch. Jewish scholars everywhere acknowledged the rabbinic learning of the late Professor Delitzsch, the well-known Hebrew translator of the New Testament.

[7] This Eliezer, surnamed the Great, had intercourse with Christians, especially with the Apostle James, and of his intercourse we read in the Talmud (Aboda Zara, fol. 17, cols. 1 and 2); see above II. B, 2, 2.—in the Midrash Mechiltha on Exod. xvi. 4 (ed. Friedmann, p. 47*b*) this saying is ascribed to Eleazar of Modiim. But he, too, lived in the 2d century A. D.

[8] See my articles on Rabbis Meïr and Tarphon in McClintock and Strong.

Jesus: "Let me pull out the mote out of thine eye" (Matt. vii. 4).

Rabbi Tarphon, (A. D. 120): "It would greatly astonish me if there could be found any one in this age who would receive an admonition. If he be admonished to take the splinter out of his eye, he would answer: Take the beam out of thine own" (Arachin, fol. 16, col. 2).

Rabbi Jochanan surnamed Bar Napha (A. D. 199-279): "Do they say, Take the splinter out of thine eye, he will answer: 'Remove the beam out of thine own eye'" (Baba Bathra, fol. 15, col. 2).

Since this saying is found in the mouth of different rabbis, may not this indicate how very widely the sayings of Jesus had spread among the people?

Jesus: "Thou hypocrite, first cast out the beam out of thine eye, and then shalt thou see" etc. (Matt. vii. 5).

Resh Lakesh (A. D. 275): "What is the meaning of the passage, Examine thyself and search (Zeph. 2, 11)? He who will reprove others must himself be pure and spotless" (Baba Mezia, fol. 107, col. 2; Baba Bathra, fol. 60, col. 2).

21. *Jesus*: "Therefore all things whatsoever ye would that men should do to you, do ye even so to them" etc. (Matt. vii. 12).

Hillel (died B. C. 5? or 10 A. D.?): "What is hateful to thyself, thou shalt not do to thy neighbor. This is the whole law, and the rest is commentary" (Shabbath, fol. 31, col. 1).

This is the famous answer which Hillel is recorded to have given to a Gentile who came to him to be converted to Judaism whilst standing on one foot, an answer which modern Jewish writers quote with a show of self-complacency, and upon which rests the assertion of Jewish writers and men like Renan, who make Jesus an imitator of Hillel.[9]

[9] Stapfer (*Palestine in the Time of Christ*, 3d. ed., New York, p. 289) says:

As to the famous answer which Hillel is said to have given, he cannot be claimed as the original author, and the Jewish historian Jost tells us that the sentence which Hillel uttered was one which at that time was familiar to everybody (*Geschichte,* I, p. 259); and any superstructure based upon the assumption that he invented it, because he in particular used it, falls to the ground. But we must bear in mind that there is a wide interval between the merely negative rule of Hillel and the positive precept of Christ. The latter said: "Therefore all things whatsoever ye would that men should do to you, do ye even so to them; for this is the law and the prophets" (Matt. vii. 12; Luke vi. 31). Hillel said: "What is hateful to thee, do not to another. This is the whole law, all else is only its explanation." The Jewish writer Hamburger (in his *Real-Encyc.,* II, p. 411) makes the remarkable admission that the negative form was chosen to make the commandment "possible" and "practical." But this is only a subterfuge. For as Edersheim correctly remarks (*loc. cit.* I, 535): "The merest beginner in logic must perceive that there is a vast difference between this negative injunction prohibiting us from doing to others what is hateful to ourselves, and the positive direction to do unto others as we would have them do unto us. The one does not rise above the standpoint of the law, being as yet far from that love which would lavish on others the good we ourselves desire; while the Christian saying embodies the nearest approach to absolute love of which human nature is capable, making that the test of

"He (Hillel) has often been regarded as a forerunner of Christianity, for which he is supposed to have prepared the way. We have ourselves spoken of him under this aspect, but as we now deem, erroneously. Our views have become modified." On p. 297 Stapfer remarks: "With Hillel, the 'neighbor' could be no other than a Jew. It never entered the mind of an Israelite of the first century that a Gentile or Samaritan could be in any sense a neighbor. Jesus was the first who dared to call the hated Samaritan 'neighbor,' and the spectacle which the churches formed by St. Paul presented twenty years later, when Jew and Gentile sat together at the table of the Lord, was a thing absolutely new. When Jesus said, 'All ye are brethren,' He founded a universal brotherhood of which Hillel had never dreamed."—Thus Stapfer, the French Protestant university teacher and countryman of Renan.

our conduct to others which we ourselves desire to possess. And be it observed, the Lord does not put self-love as the principle of our conduct, but only as its ready test."

Another point is that similar sayings are found long before Hillel. Thus Diogenes Laertius relates that Aristotle (died after 322 B. C.), when asked how we ought to conduct ourselves toward our friends, answered: "As we would wish they would carry themselves toward us." And Isocrates, who lived four hundred years before the publication of the Gospel, said:

ἃ πάσχοντες ὑφ' ἑτέρων ὀργίσετε ταῦτα τοῖς ἄλλοις μὴ ποιεῖτε,

i. e., "we must not do to others that which would cause anger if it were done to ourselves." In the apocryphal book of Tobit we read (iv. 15):

ἃ μισεῖς μηδενὶ ποιήσῃς,

i. e., "Do to no man that which thou hatest."

In the so-called Epistle of Aristeas, which purports to give a history of the origin of the translation of the Old Testament into Greek or the Septuagint, the same idea is put into the mouth of one of the Jewish sages, who, to the question of the king, What is the teaching of wisdom? explains: "If you who wish not that evil befall you, but rather everything good, do the same to your subjects, and to those who err, and reprimand the good men mildly."

22. *Jesus*: "Therefore whosoever heareth these sayings of mine, and doeth them, I will liken him unto a wise man which built his house upon a rock" etc. (Matt. vii. 24-27).

Rabbi Eliezer ben Azariah (about A. D. 82): "He whose knowledge surpasses his good deeds may be compared to a tree with many branches and a scanty root—every wind shakes and uproots it. But he whose good deeds excel his knowledge may be compared to a tree with a few branches and strong roots; if all the hurricanes of

wise among them adorned themselves and waited at the entrance of the king's palace, saying: Can there be anything wanting at the king's house (which may delay the banquet)? But the foolish among them went after their work, saying: Can there be a banquet without preparation? Suddenly the king asked for his servants, when the wise among them entered adorned, but the foolish came into his presence soiled. The king rejoiced to meet the wise servants but was angry with the foolish servants. Let those, said he, who have adorned themselves for the banquet sit down to eat and drink, but let those who have not adorned themselves for the banquet stand and look on."

May not this rabbi have had in mind the Parable of the Ten Virgins?

26. *Jesus*: "For in the resurrection they neither marry nor are given in marriage, but are as the angels of God in heaven" (Matt. xxii. 30).

Rab (died 247 A. D.): "In the world to come there is neither eating nor drinking, neither fruitfulness nor increase, neither trade nor business, neither envy, hatred, nor strife; but the righteous sit with their crowns on their heads, and feast themselves on the splendor of the Shechinah, as it is written (Exod. xxiv. 11): They saw God, and did eat and drink" (Berachoth, fol. 17, col. 1).

This reads like a rabbinic adaptation of the saying of Christ.

27. *Jesus*: "And whosoever shall exalt himself shall be abased; and he that shall humble himself shall be exalted" (Matt. xxiii. 12).

Rabbi Jeremiah (died A. D. 250): "Whosoever makes himself little in this world for the sake of the word of the law will be made great in the world to come, and whosoever makes himself a slave in this world for the sake of the word of the law will be made free in the world to come" (Baba Meziah, fol. 85, col. 2).

28. *Jesus*: "The Sabbath was made for man, and not man for the Sabbath" (Mark ii. 27).

Rabbi Jonathan ben Joseph (flourished after the destruction of the Temple): "It is written, Ye shall keep the Sabbath, therefore, for it is holy unto you (Exod. xxxi. 14). It is handed over to you, not ye are handed over to the Sabbath" (Yoma, fol. 85, col. 1).

This saying reminds us forcibly of Christ's words, and as Stapfer (*loc. cit.*, p. 357) justly remarks: "We cannot help asking, Is not this saying probably later than that of Christ, and suggested by it?"

From the foregoing parallels it will be evident that the claim that the New Testament copied the Talmud must accordingly be stigmatized once for all as a vain glorification of modern Judaism, which, on the one hand, rejects the Talmud as a religious code, but, on the other, makes use of it for controversial purposes. What are the inevitable conclusions from the facts? It is clear that the sayings of Jesus are the original, and the supposed parallels the copy. If it were not so, how comes it that not all that is in the Gospels can be traced back to Talmudic sources? Says Geikie (*Life and Words of Christ*, New York, 1881): "There has been of late a tendency to exalt the Talmud at the expense of the New Testament; but let any one take up a translation of any part of it, and the exaggeration of such an estimate will at once be seen." Dunlop Moore, the author of the article "Talmud" (in the *Schaff-Herzog Encyclop.*) says: "It is admitted, too, that the Talmud has borrowed from the neighbors of the Babylonian Jews superstitious views and practices notoriously contradictory to the spirit of Judaism. Why, then, may it not have appropriated Christian sentences also?" And says Farrar concerning these so-called parallels: "Who will supply us with the faintest approach to a proof that, when not founded in the Old Testament, they were not directly or indirectly

due to Christian influence or Christian thought?" (*Life of Christ,* II, 485).

Even if we assume that Jesus and His apostles borrowed from the rabbis all the expressions that occur both in the New Testament and in the Talmud, it does not prove anything. The Gospel of Jesus remains an altogether new thing, and the spiritual life that He awakened is still diametrically opposed, in many respects, to the religious life that the Talmud fosters.

BERNHARD PICK.

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THE CONSTRUCTION OF MAGIC SQUARES AND RECTANGLES BY THE METHOD OF "COMPLEMENTARY DIFFERENCES."[1]

WE are indebted to Dr. C. Planck for a new and powerful method for producing magic squares, rectangles etc. This method is especially attractive and valuable in furnishing a *general* or *universal* rule covering the construction of all conceivable types of squares and rectangles, both odd and even. It is not indeed the easiest and best method for making *all kinds* of squares, as in many cases much simpler rules can be used to advantage, but it will be found exceedingly helpful in the production of new variants, which might otherwise remain undiscovered, seeing that they may be non-La Hireian and ungoverned by any obvious constructive plan.

When a series of numbers is arranged in two associated columns, as shown in Fig. 1, each pair of numbers has its distinctive difference, and these "complementary differences," as they are termed by Dr. Planck, may be used very effectively in the construction of magic squares and rectangles. In practice it is often quite as efficient and simpler to use the half differences, as given in Fig. 1.

In illustrating this method we will first apply it to the construction of an associated or regular 3×5 magic rect-

[1] This article has been compiled almost entirely from correspondence received by the writer from Dr. Planck, and in a large part of it the text of his letters has been copied almost verbatim. Its publication in present form has naturally received his sanction and endorsement. W. S. A.

angle, in which the natural numbers 1 to 15 inclusive are to be so arranged that every long row sums 40, and every short column sums 24. The center cell must necessarily be occupied by 8, which is the middle number of the series, and the complementary numbers must lie in associated cells, such as $a\ a - b\ b - c\ c$ in Fig. 2.

The first operation is to lay out a 3×5 rectangle and fill it with such numbers that all the short columns shall sum 24, but in which the numbers in the columns will not be placed in any particular order. When two columns of this rectangle are filled, three pairs of complementary

1	15	7
2	14	6
3	13	5
4	12	4
5	11	3
6	10	2
7	9	1
	8	

Fig. 1.

a				b
	c		c	
b				a

Fig. 2.

2	5	4	3	1
7	6	8	10	9
15	13	12	11	14

Fig. 3.

numbers will have been used, and their differences will have disappeared, as these two columns must each sum 24. Hence, *one complementary difference must equal the sum of the other two.*

We have therefore (neglecting the middle column) to make two equations of the form $a = b + c$ from the complementary differences, without using the same difference twice. Thus:

$$\left.\begin{aligned} 7 &= 6 + 1 \\ 5 &= 3 + 2 \end{aligned}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (\mathrm{I})$$

is such a pair of equations.

The first equation indicates that the greater of the two complements whose half difference is 7 can lie in the same column with the lesser members of the pairs whose half differences are 6 and 1. In other words, the numbers 15, 7 and 2 can lie in one column, and their complements 14, 9 and 1 in the associated column. The second equation $(5 = 3 + 2)$ gives similar information regarding the other pair of associated columns, and the three remaining numbers must then be placed in the middle column, thus producing the rectangle shown in Fig. 3.

These equations determine nothing as to the placing of the numbers in the rows, since in Fig. 3 the numbers in the columns have no definite order.

The rows may now be attacked in a similar manner. Two of the complementary differences in the upper or lower row must equal the other three, and the equation will therefore be of the order $a + b = c + d + e$.

In order that the disposition of numbers in the columns shall not be disturbed, the numbers used in this equation must be so chosen that any *two* numbers which appear together on the *same side* of an equality sign in the short column equation, must not so appear in a long row equation, also if two numbers appear on the *opposite sides* of an equality sign in a short column equation, *they must not so appear* in the long row equation.

There is only one such equation which will conform to the above rules, viz.:

$$6 + 2 = 4 + 3 + 1.$$

Interpreting this as before we have the rectangle given in Fig. 4, in which each of the three rows sums 40. We have now two rectangles, Fig. 3 showing the correct numbers in the columns, and Fig. 4 showing the proper disposition of the numbers in the rows. By combining them

we get the associated or regular magic rectangle given in Fig. 5.

If a mere shuffling of pairs of complementary rows or columns is ignored, this is the *only* solution of the problem.[2]

4	5	7	10	14
1	3	8	13	15
2	6	9	11	12

Fig. 4.

7	5	4	10	14
15	13	8	3	1
2	6	12	11	9

Fig. 5.

There are two pairs of equations of the form

$$a = b + c$$
$$d = e + f$$

namely, the one given in (I) and

$$\left.\begin{aligned} 7 &= 5 + 2 \\ 4 &= 3 + 1 \end{aligned}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad \text{(II)}$$

and there are nine equations of the form

$$a + b = c + d + e$$

but of these nine equations only one will go with (I) and none will go with (II) so as to conform with the above rules.

If the condition of association is relaxed there are thirty-nine different 3×5 magic rectangles.

This method can naturally be used for constructing all sizes of magic rectangles which are possible,[3] but we will only consider one of 5×7 as a final example.

[2] The solution of this problem of the associated rectangle is the first step in the construction of the higher ornate magics of composite odd orders. For example, if the above single solution for the 3×5 rectangle did not exist it would be impossible to construct a magic, pan-diagonal, associated (= regular) square of order 15, which shall be both 9-ply and 25-ply, i. e., *any* square bunch of 9 cells to sum up 9 times the mean, and *any* square bunch of 25 cells 25 times the mean. C. P.

[3] A magic rectangle with an odd number of cells in one side and an even number in the other, is impossible with consecutive numbers. C. P.

Fig. 6 shows the associated series of natural numbers from 1 to 35 with their half differences, from which the numbers must be chosen in accordance with the above

1	35	17
2	34	16
3	33	15
4	32	14
5	31	13
6	30	12
7	29	11
8	28	10
9	27	9
10	26	8
11	25	7
12	24	6
13	23	5
14	22	4
15	21	3
16	20	2
17	19	1
18		

Fig. 6.

19	22	33	29	23	21	20
35	31	34	25	30	24	25
9	10	4	18	32	26	27
11	12	6	7	2	5	1
16	15	13	8	3	14	17

Fig. 7.

30	31	34	1	7	9	14
25	26	28	16	15	13	3
32	24	19	18	17	12	4
33	23	21	20	8	10	11
22	27	29	35	2	5	6

Fig. 8.

9	31	34	7	30	14	1
16	15	13	28	3	26	25
19	12	4	18	32	24	17
11	10	33	8	23	21	20
35	22	6	29	2	5	27

Fig. 9.

rules. In this case there will be three equations of the order

$$a+b=c+d+e$$

for the columns, and two equations of the order

$$a+b+c=d+e+f+g$$

for the rows. The following selection of numbers will satisfy the conditions:

$$\left.\begin{aligned} 1+17 &= 9+7+2 \\ 4+13 &= 8+6+3 \\ 15+16 &= 14+12+5 \end{aligned}\right\} \quad \ldots\ldots\ldots\ldots \text{(III)}$$

for the columns, and

$$\left.\begin{aligned} 12+13+16 &= 17+11+9+4 \\ 7+8+10 &= 2+3+5+15 \end{aligned}\right\} \quad \ldots\ldots \text{(IV)}$$

for the rows.

Fig. 7 is a rectangle made from (III) in which all the columns sum 90, and Fig. 8 is a rectangle made from (IV) in which all the rows sum 126. Combining these two rectangles produces Fig. 9 which is magic and associated.

We will now consider this method in connection with magic squares and will apply it to the construction of a square of order 5 as a first example. In this case two equations of the order

$$a+b=c+d+e$$

will be required for the rows and two more similar equations for the columns.

The following will be found suitable for the rows:

$$\left.\begin{aligned} 12+11 &= 10+9+4 \\ 8+6 &= 7+5+2 \end{aligned}\right\} \quad \ldots\ldots\ldots\ldots \text{(V)}$$

and

$$\left.\begin{aligned} 11+8 &= 12+6+1 \\ 10+7 &= 9+5+3 \end{aligned}\right\} \quad \ldots\ldots\ldots\ldots \text{(VI)}$$

for the columns.

It will be seen that the rule for pairs of numbers in the same equation is fulfilled in the above selection. In (V) 12 and 11 are on the same side of an equality sign, but in (VI) these numbers are on opposite sides, also, 10 and 9 are on the same side in (V) and on opposite sides in (VI) and so on:

The resulting magic square is given in Fig. 10, it is non-La Hirean, and could not easily be made in any way other than as above described.

24	3	9	4	25
21	6	11	5	13
12	16	13	10	14
7	18	15	20	5
1	22	17	23	2

Fig. 10.

The construction of a square of order 6 under this method presents more difficulties than previous examples, on account of the inherent disabilities natural to this square and we will consider it as a final example. The method to be employed is precisely the same as that previously discussed.

For the columns three equations should be made of the form:

$$a+b+c=d+e+f$$

or

$$a+b\quad=c+d+e+f$$

and three similar equations are required for the rows, all being subject to the rule for "pairs and equality sign" as above described. On trial, however, this will be found to be impossible,[4] but if for one of the row- or column-equations we substitute an *inequality* whose difference is 2 we

[4] It is demonstrably impossible for all orders $= 4n+2$, i. e., 6, 10, 14 etc. C.P.

shall obtain a square of 6, which will be "associated," but in which two lines or columns will be erratic, one showing a correct summation —1 and the other a correct summation +1. The following equations (VII) may be used for the columns:

$$\left.\begin{aligned} 11 + 7 &= 9 + 5 + 3 + 1 \\ 25 + 17 + 13 &= 21 + 19 + 15 \\ 35 + 31 + 23 &= 33 + 29 + 27 \end{aligned}\right\} \ldots \text{(VII)}$$

and for the rows:

$$\left.\begin{aligned} 29 + 25 &= 33 + 13 + 7 + 1 \\ 35 + 19 + 3 &= 31 + 21 + 15 \\ 27 + 23 + 17 + 15 + 11 + 9 & \end{aligned}\right\} \ldots \text{(VIII)}$$

the last being an *inequality*. Fig. 11 shows the complementary pairs of natural numbers 1 to 36 with their whole differences, which in this case are used in the equations (VII) and (VIII) instead of the half differences, because these differences can not be halved without involving fractions. Fig. 12 is the square derived from equations (VII) and will be found correct in the columns. Fig. 13 is the square formed from equations (VIII) and is correct in the 1st, 2d, 5th, and 6th rows, but erratic in the 3d and 4th rows. The finished six-square made by combining Figs. 12 and 13 is shown in Fig. 14 which is associated or regular, and which gives correct summations in all the columns and rows excepting the 3d and 4th rows which show —1 and +1 inequalities respectively.

Fig. 14, like Fig. 10, could not probably be produced by any other method than the one herein employed, and both of these squares therefore demonstrate the value of

the methods for constructing new variants. Fig. 14 can be readily converted into a continuous or pan-diagonal square by first interchanging the 4th and 6th columns and then, in the square so formed, interchanging the 4th and

1	36	35
2	35	33
3	34	31
4	33	29
5	32	27
6	31	25
7	30	23
8	29	21
9	28	19
10	27	17
11	26	15
12	25	13
13	24	11
14	23	9
15	22	7
16	21	5
17	20	3
18	19	1

Fig. 11.

24	31	36	35	29	21
22	27	34	33	28	20
14	25	30	32	26	19
16	8	2	1	6	13
17	9	4	3	10	15
18	11	5	7	12	23

Fig. 12.

33	31	2	12	15	18
36	28	20	3	8	16
32	30	10	11	13	14
26	24	23	5	7	27
34	29	21	1	9	17
25	22	19	4	6	35

Fig. 13.

18	31	2	33	12	15
16	8	36	3	28	20
14	11	30	32	10	13
24	27	5	7	26	23
17	9	34	1	23	21
22	25	4	35	6	19

Fig. 14.

and 6th rows. The result of these changes is given in Fig. 15 which shows correct summations in all columns and rows, excepting in the 3d and 6th row which carry

the inequalities shown in Fig. 14. This square has lost its property of association by the above change but has now correct summation in all its diagonals. It is a demonstrable fact that squares of orders $4n + 2$, (i. e., 6, 10, 14 etc.) cannot be made perfectly magic in columns and rows and at the same time *either* associated or pandiagonal when constructed with consecutive numbers.

18	31	2	15	12	33
16	8	36	20	28	3
14	11	30	13	10	32
22	25	4	19	6	35
17	9	34	21	29	1
24	27	5	23	26	7

Fig. 15.

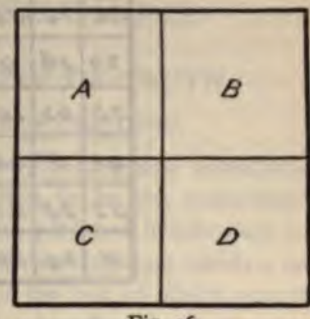

Fig. 16.

Dr. Planck also points out that the change which converts all even associated squares into pan-diagonal squares may be tersely expressed as follows:

Divide the square into four quarters as shown in Fig. 16.

Leave A untouched.

Reflect B.

Invert C.

Reflect and invert D.

7	12	1	14
2	13	8	11
16	3	10	5
9	6	15	4

Fig. 17.

7	12	14	1
2	13	11	8
9	6	4	15
16	3	5	10

Fig. 18.

The inverse change from pan-diagonal to association is not necessarily effective, but it may be demonstrated with the "Jaina" square given by Dr. Carus in *Magic*

Squares and Cubes, p. 125, which is here reproduced in Fig. 17. This is a continuous or pan-diagonal square, but after making the above mentioned changes it becomes an associated or regular square as shown in Fig. 18.

1	44	32	53	2	43	31	54
58	19	39	14	57	20	40	13
38	15	59	18	37	16	60	17
29	56	4	41	30	55	3	42
23	62	10	35	24	61	9	36
48	5	49	28	47	6	50	27
52	25	45	8	51	26	46	7
11	34	22	63	12	33	21	64

Fig. 19.

Magic squares of the 8th order can however be made to combine the pan-diagonal and associated features as shown in Fig. 19 which is contributed by Frierson, and this is true also of all larger squares of order $8n$.

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SCHENECTADY, N. Y.

CRITICISMS AND DISCUSSIONS.

HEINRICH HERTZ'S THEORY OF TRUTH.

A CONTRIBUTION TO CRITIQUE OF COGNITION.

In a paper read before the American Philosophical Association in 1902,[1] I explained critique of cognition to be the examination of systems of cognition *according to principles* and briefly sketched out these principles. They were formulated as conditions which a system must satisfy, and formed four groups the last of which was the group of the conditions of *truth*. This group has the remarkable property that it requires the fulfilment of all the other conditions. We can therefore say that critique of cognition has for its problem the determination of the content of truth of the systems of cognition. Its principles can be considered as principles of truth, and so it is clear that the problem of truth is the most important and deepest which the establishment of the principles of critique of cognition offers.

The first condition of this last group determines the truth of a system *with relation to its generating problem*; a second condition determines the truth of *the generating problem itself* and therewith the truth of the system not relatively to its own problem but with respect to the system of cognition.

The conditions of truth have been formulated differently in the different schools. We can distinguish two large groups and call them (1) the group of the external conditions of truth and (2) the group of the internal conditions of truth. The first, in determining the truth of a system B, takes another system A as given; the truth of the system B is then determined with respect to A as "agreement" or "correspondence" of B with A. It goes beyond the system B to *another* system A, the "object," or "nature," or the "things." It is the theory of truth of *realism* or *dualism*. The other does not take

[1] See *Journal of Philos.*, VI, No. 11, p. 281.

such a system A as given but remains within the system B and determines truth as a condition for the system B itself. It is the theory of truth of *idealism* or *monism.*

The dualistic theory of truth has the disadvantage of a seeming clearness, determinateness and easy application. We can represent A and B as realms by two circles; they are determined by their laws of necessity; the realm A is the realm of natural necessity (*Naturgesetzlichkeit*), the realm B that of logical necessity (*Denkgesetzlichkeit*).

If then b_ν is any element of B, I can apply the condition of truth to it and say: b_ν is a true system, (concept, theorem), if there is an a_ν with which it *agrees.* I think it is not saying too much to assert that dualism has recommended itself to scientific thinking by its seemingly useful theory of truth.

However at nearer examination it offers great difficulties. It is not my intention to consider them here in general, but to criticise a special case, which is however of conspicuous importance for the whole theory.

Even if we presuppose for the present that we know what is to be understood by this agreement (correspondence) and how it is to be measured, we must ask: how far must the correspondence go? Shall we understand that by this is meant a complete correspondence, or may it be partial? And if the latter, shall that mean that any correspondence suffices to make the system B a true one? If not, it must be determined exactly how far this correspondence must go, and then it will not be the correspondence in general which determines the truth but this precisely-to-be-determined degree of correspondence.

Of all those who have stated a realistic theory of truth Heinrich Hertz alone, so far as I am aware, has tried to determine this degree of correspondence. His theory, which he has developed in the famous introduction to his *Principien der Mechanik,* is the special case of which I spoke, and which we shall criticise.

The realms A and B are with him also determined by the laws of their necessity, A by the *Naturnothwendigkeit,* B by the *Denknothwendigkeit*; A is "things," B the *Scheinbilder* or "symbols," which we ourselves "make" of the things. The elements of B as mere *Scheinbilder* or symbols have of course of themselves no agreement whatsoever with things, neither complete nor partial. But we make these *Scheinbilder* so that they satisfy a certain condition, which we shall designate by V and call the condition of truth.

Hertz himself calls V the *Grundforderung* (fundamental requirement or condition) and the symbols which satisfy it, *Bilder* (images) or more exactly *richtige Bilder* (correct images). In so far as the elements of B satisfy the condition V, he says that they *correspond* to the elements of A. The images are called also our "representations of the things." "They have the one essential correspondence with things which lies in the fulfilment of the above-named condition (V), but it is not necessary for their purpose that they have any further correspondence with the things. Indeed we know not and have no means of finding out, whether our representations of things agree with them in anything else than just that one fundamental relation."[2] All those naive theories which speak of a complete correspondence of our representations to the things, or of a correspondence at all which belongs to the representations as such are therewith placed outside discussion; we "make" these representations and we call them "correct," or true, or in correspondence with the things, if they satisfy a certain condition V.

Everything depends therefore on this condition V; it determines the truth of the realm B. Its critique is the critique of his theory of truth. Hertz formulates it thus: we make the symbols of the outer objects "such that the logically necessary consequences of the images are always again the images of the naturally necessary consequences of the depicted objects."[3] The content of this condition seems to be precisely that great method of determining truth in physics, namely, the experiment.

It will be useful for our further consideration to represent condition V symbolically. If I designate by b_μ and b_ν two images, by $f_l(b_\mu)$ the logically necessary consequence of b_μ, by a_μ and a_ν two things, by $f_n(a_\mu)$ the naturally necessary consequence of a_ν, and by ϕ a law of representation, according to which to every a_λ belongs a definite b_λ, then condition V can be formulated thus:

$$\begin{aligned} &\text{If } b_\nu = f_l(b_\mu) \\ &\text{and } a_\nu = f_n(a_\mu) \\ &\text{then } b_\mu = \phi(a_\mu) \text{ is a true image} \\ &\text{if } b_\nu = \phi(a_\nu) \end{aligned}$$

On the other hand we can say: For every image $b_\mu = \phi(a_\mu)$, which satisfies condition V,

$$\begin{aligned} b_\nu &= \phi(a_\nu) \\ \text{if } a_\nu &= f_n(a_\mu) \\ \text{and } b_\nu &= f_l(b_\mu) \end{aligned}$$

[2] *Principien der Mechanik*, p. 2.
[3] *Principien der Mechanik*, p. 1.

From this follows: it is necessary that

$$b_\nu = \phi[f_n(a_\mu)]$$
$$\text{if } b_\nu = f_l(b_\mu)$$

That is, the condition requires that I obtain the *same* image b_ν, whether I determine it as the *denknothwendige* consequence of b_μ or as the image of the *naturnothwendige* consequence of a_μ.

We can express this as follows: If B is a realm for which the condition V is satisfied, then B is closed in itself with respect to the operation f_l; i. e., every logically necessary consequence of any elements of B is itself an element of B; because it can always be considered as image of an element of A; that is,

$$\text{if } w = f_l(b_\lambda)$$
$$\text{then } w = \phi(a_\kappa)$$
$$= b_\kappa \text{ if V is satisfied.}$$

If therefore such a realm B for which the condition V is satisfied, is once determined, it can be considered as *Modell* of A; i. e., the image of any A can be obtained by logically necessary conclusions from B. And this task, to determine B so that in our considerations it can be substituted for A, is the purpose which we have in establishing B. We start with A, which we consider as given; this we represent, in conformity with the condition V, by B which we finally substitute for A. The possibility of this substitution is expressed by the equation, and we can therefore finally say: If a realm A is given, and B is determined as image of A such that the condition V is satisfied, then:

$$A = B.$$

We have now sufficiently analyzed the fundamental requirement to be prepared for its critique.

I preface it with the remark that we must carefully distinguish between the thesis: B is a true system because it has with an (objectively given) realm A the correspondence specified by the fundamental condition V; and the thesis: if B is a true system it can be considered as image of a realm A which we call objectively given and with which it has the correspondence specified by V. For the first thesis the realm A is essential, for the correspondence with A makes B a true system. This is the thesis of Heinrich Hertz. For the second, A is not essential, since B is otherwise determined as true; the realm A can be considered as an interpretation of the system B, or *vice versa* B as image of a realm A presupposed as given. This way of conceiving B has proven very convenient for the natural sciences and is therefore in general, probably unavoidable, use; only it is im-

portant to remark that this is by no means essential for a pure system of natural science.

The realm B is the realm of the images of A; they are symbols which are determined as a realm by "logical necessity"; *but by what condition are they determined as images of elements of A?* That is, by what condition are these symbols distinguished as images of A from other symbols in the realm of logical necessity?

To this we can answer that the realm B *is* the realm of the images of A. But by this we would say that what is logically necessary is *eo ipso* image of something naturally necessary; the realms "logical necessity" and "image of A" coincide. But this was evidently not the thesis. The distinction of the realms A and B originated in the conviction that there was logical necessity, which did not represent natural necessity; in other words, that the criterion of logical necessity was not sufficient for the determination of truth. But if we say that the image of A lies indeed in the realm D of logical necessity, then we must specify the condition by which B is distinguished from the rest of D. This question is the more urgent if we base the condition of truth on the property of being an image, as Heinrich Hertz does. For the *Grundforderung* says: b_μ is a *true* image, if b_ν, the logically necessary consequence of b_μ, is the *image* of a_ν, the naturally necessary consequence of a_μ.

$$\text{If } b_\nu = f_l(b_\mu)$$
$$\text{then } b_\nu = \phi[f_n(a_\mu)]$$

We must therefore have a condition by which we determine whether b_ν is indeed image of $a_\nu = f_n(a_\mu)$. If every logical necessity were *eo ipso* image of a natural necessity, then the fundamental condition would be superfluous. We cannot say here that these images are given to us by sensation; for we "make" these images and the images are mere "symbols."

This first answer to the question: what is the condition which the symbols must satisfy in order to be images of A, led to the destruction of the *Grundforderung*. But a second answer is possible, and it seems as if Hertz himself had had it in mind, namely, *that the condition that we seek, is the condition V itself.* He says: "We make for ourselves inner *Scheinbilder* or symbols of outer objects and we make them so that the logically necessary consequences of the images are always again the images of the naturally necessary consequences of the represented objects"; or in our formulation, we make them so that they satisfy condition V.

Then the condition of truth and the condition of being an

image are the same. Symbols of the realm B of the logical necessity which satisfy the condition V, are at the same time images and true images. In other words: a symbol b_λ is either a true image of a_λ, or it is *not* a true image; whether it then can still be an image at all, as for instance a *false* image,—about this we know nothing.

The formulation, "image and true image are identical," is indeed required by the condition V itself. For we said:

$$b_\nu = \phi\,[f_n\,(a_\mu)]$$

where it is evident that we must understand by the representation ϕ a true image; i. e., if b_ν might possibly be a false image then it could decidedly not prove that b_μ, from which it logically follows, is a true image.

If we now write ϕ_t for a *true* representation, then V will take the form:

$$\text{if } b_\nu = \phi_t\,(a_\nu)$$
$$\text{then } b_\mu = \phi_t\,(a_\mu)$$

Thus the truth of b_μ is based, by the fundamental condition V, on the truth of its logically necessary consequence, therefore on the truth of another image, and it would be necessary for us to have previously somehow and from somewhere a true image, then we could by means of V determine the truth of other images. Still we could not determine the truth of the first image by the condition V. So Hertz forsakes his first point of view, that the images are mere symbols, in themselves neither similar nor different, neither true nor false; and takes his refuge in another criterion of truth, namely experience. "If we have once succeeded in deducing from the collected past experience images of the required quality..." This however means nothing but that the condition V as criterion of truth has been given up, it was to decide about the truth of the images; instead he appeals to the *angesammelte Erfahrung* to give us true images and at the same time to guarantee them!

KARL SCHMIDT.

PEQUAKET, N. H.

A MONISTIC CONCEPTION OF LIFE AND LIFE AFTER DEATH.

IN REPLY TO JOHAN GUSTAF BJOERKLUND AND HIS EXPOUNDER, MR. J. E. FRIES.

Among the thinkers who have pondered over the problem of the immortality of the soul, Gustaf Björklund is prominent by reason

of originality and keenness of thought; and yet knowledge of his theory has remained limited to his own country, Sweden. The rest of the world has taken very little notice of his propositions because his books have heretofore remained untranslated. While admitting the significance of Björklund as a thinker I cannot accept his arguments or conclusions, and I will here state briefly the main points which I have to make in comment upon Mr. J. E. Fries's exposition of them in his article "Death and Resurrection" (*The Monist*, April, 1910).

First I will briefly point out that my idea of nature is different from Björklund's. The very word "nature" means "growth," and so does its Greek equivalent *physis*. Growth, development, activity is the most obvious feature which unsophisticated man observed in the world. Yea, the word "world" itself conveys the same idea as the Latin *natura*, for it is derived from a Saxon root which means "becoming, growing, developing," and which is still preserved in the German *werden*. Mr. Björklund would exclude from nature its most characteristic feature of self-motion, of producing configurations of higher units, of building up and storing energy as it appears in the vegetation of our globe. The notion that this world consists of inert substance is of very late origin and is due to the analysis made by the chemist who by dissecting life and separating higher units retains its dead elements. By destroying a complex we retain the unrelated parts, and yet the chemist knows very well, or he ought to know, that there is no inert matter. All matter is aglow with a tendency to act, and this tendency does not enter into matter from the outside, but is its inalienable and intrinsic characteristic.

There is no inert matter in the sense that its particles are dead and show symptoms of activity only by a push from the outside. Gravity and all other forces of nature are qualities inherent in matter, and it is not an extraneous energy which pushes the stone toward the ground but it is its own innate life which responds according to given conditions.

It is true, as Mr. Fries says, that I have repeatedly declared that vitality or life force is a quality *sui generis*. It is an energy of its own and different from all other energies, just as electricity is different from light and from other motion. But Mr. Fries misunderstands my statement if he thinks that according to my view there are two kinds of energy, life energy and physical energy. There is only one energy and this energy appears in different forms, each one being *sui generis* in the sense that it is different from the

others, but every one of them can be changed into any of the others according to conditions. Molar motion, or change of place of entire masses, is energy, and molar motion can be changed into heat. Heat is a motion of the very particles of matter among themselves, and it can be changed into ether waves such as light and electricity. A commotion of ether is decidedly different from a commotion of material atoms, and this again from a mere change of place of whole masses. And yet each of these three motions can be transformed into any of the others. Chemical combination is again a kind of energy of its own, though it incidentally may be combined with either or both, heat and electricity, and even molar motion, as e. g., in explosions; yet when we come to a consideration of life forces we find that they are more complicated than all others. Nevertheless they contain all others, and vital functions are *sui generis* only in so far as they constitute a constant round of continuous functions. Life appropriates foreign materials by assimilation to build up new life according to its kind, and this is called growth. A similar process takes place in inorganic nature, for crystals grow also and assimilate matter to their own form. The most important characteristic of life force, however, is its organization into higher units, a storing up of energy which animal life spends in locomotion. In spite of being a process *sui generis* it is nothing but a combination of all other kinds of energy. This product of a higher unity contains new features as do all unifications, and the interconnection of the latent life forces, of potential sentiency, produces in animal substance a condition of awareness called feeling, and from feeling the soul develops, with all its wonderful faculties. I can not enter into the details of an explanation of the origin of the soul. I will only insist that the process is as mysterious as other phenomena in the physical, chemical and vegetal domains, but not more so. I claim that there is only one mystery pervading the whole universe and this mystery is existence—the existence of the universe itself. The same mystery confronts us in the formation of a crystal as much as in chemical combinations, in the spontaneity of the falling stone and in the growth of a tree. Everywhere we have self-activity, an inherent faculty of combining into units, or building up structures, or of organizing into higher life units, called organisms, and if we wanted to assume a special outside power to accomplish any one of these functions we would have to assume a specific energy for chemical life, for the growth of crystals, for plant life and the formation of the soul. I grant that the formation of living plasma is a mystery,

but it would be a greater mystery still if we assumed in addition to the general world mystery a second mystery which comes into the world from the outside.

If we call the domain of physical activity nature or physics I will gladly grant that the domain of organized life constitutes a higher realm, and we may call it supernatural or hyperphysical, but this supernatural life has not, so far as we can see, come from the outside of the world into it, but lies latent in the very constitution of all existence. The hyperphysical grows from the physical, the supernatural develops naturally from the natural, the conditions of the higher lie concealed in the lower forms of cosmic being.

Life is a continuous process and every organism is the link of a long chain. The problem of the origin of life is not yet ripe for solution. Our microscopists have not yet discovered the most primitive life forms, and if they had they would most likely be disappointed to find themselves confronted with a new problem. It is more than probable that there is an intermediate domain between purely chemical processes and organization, and this domain would exhibit activities like that known as fermentation. At any rate we must bear in mind the important role played in organized life by memory. Think of it that the tiniest bacillus has become what it is by the previous activity of its ancestry, and if we want to reproduce it, we would have to repeat in due succession the very same conditions through which it has passed since its differentiation from the most primitive vital function into a definite bacillus. Such is the conclusion which we must accept according to what we know of life. Is it then probable that we shall ever be able to manufacture even the smallest organism?

The formula *omne vivum ex vivo* must be rendered more exact by restating it thus: Organized life is a continuous process and the nature or quality of every organism is determined by the nature or quality of its ancestors. We may add by way of hypothesis, based on what we know of life, that the nature or quality of every organism consists in the traces of its own activity. Everything that exists (including the tiniest spark of organized life) is acted upon by its surroundings and reacts upon these impressions or impacts received. Life is a function, and its essential characteristic is the constant flux of metabolism in which however the forms of the old traces are preserved.[1] This is conditioned by the viscosity of living substance which

[1] See "Have Atoms Souls?" *Open Court*, XXIV, 119-122. For further articles on the soul see bibliography of the author, *Philosophy as a Science*, p. 175

renders it very plastic. Every commotion produces a modification of the structure, a vestige, and if the same kind of commotion is repeated the vestige grows stronger and finally develops into an organ. Every organ is the product of its function. Function precedes the formation of organs and is the result of the preservation of a definite and constantly repeated mode of response to a certain kind of stimulus. In the higher sphere of psychic life this preservation of the form of functions is called "memory," and so we may say that every organism is the product of memory. Every bacillus has become what it is by its own doings. Because naturalists have been unable to make organisms we need not jump at the conclusion that organic life has come into the world from the outside, especially as there is no gap between life and inorganic forces, between living substance and so-called inert matter. The transformation of chemical elements into human limbs and brains is an object of common observation.

The significance of Björklund's work consists more in his intentions than in his accomplishments; it lies in his attempt at solving the selfsame problem which plays so prominent a part in religion. "When a man dies shall he live again?" We see that the body decays and nothing is left but ashes. The only answer as to the fate of man is expressed in the Biblical passage, attributed by the author of the third chapter of Genesis to God himself: "For dust thou art and unto dust shalt thou return," and the same truth is most impressively reiterated in Eccl. iii. 19-20. But in spite of everything, man feels instinctively that death does not end all, and he is right. The problem is solved when we understand the part which memory plays in the development of life. Memory builds up organisms, memory shapes our souls, memory makes evolution and progress possible, and memory means immortality. As man does not come from nothing, but is the continuation of his past, so he is not annihilated but his doings and his thoughts, the significance of his life, his soul continues after him. He rests from his labors, but his works follow him. Our life consists of work, and it is in our works that we live on after death.

EDITOR.

MAGIC CIRCLES AND SPHERES.

Magic circles and spheres have been apparently much less studied than magic squares and cubes. We cannot say that this is because their range of variety and development is limited; but it may

be that our interest in them has been discouraged, owing to the difficulty of showing them clearly on paper, which is especially the case with those of three dimensions.

It is the aim of the present paper to give a few examples of what might be done in this line, and to explain certain methods of construction, which are similar in some respects to the methods used in constructing magic squares.

MAGIC CIRCLES.

The most simple form of magic spheres is embodied in all perfect dice. It is commonly known that the opposite faces of a die contain complementary numbers; that is, 6 is opposite to 1, 5 is

Fig. 1.

Fig. 2.

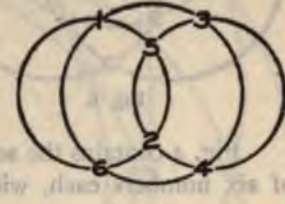

Fig. 3.

opposite to 2, and 4 is opposite to 3—the complementaries in each case adding to 7—consequently, any band of four numbers encircling the die, gives a summation of 14. This is illustrated in Fig. 1,

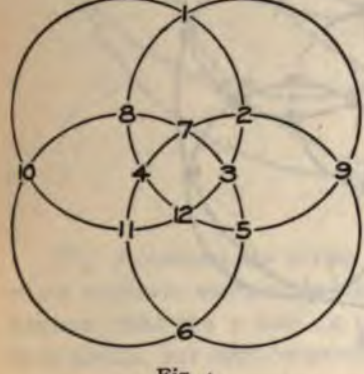

Fig. 4.

Fig. 5.

which gives a spherical representation of the die; and if we imagine this sphere flattened into a plane, we have the diagram shown in Fig. 2 ,which is the most simple form of magic circles.

Fig. 3 is another construction giving the same results as Fig. 2; the only difference being in the arrangement of the circles. It will be noticed in these two diagrams that any pair of complementary numbers is common to two circles, which is a rule also used in constructing many of the following diagrams.

Fig. 3.

Fig. 4.

Fig. 4 contains the series 1, 2, 3 ..... 12 arranged in four circles of six numbers each, with totals of 39. Any one of these circles laps the other three, making six points of intersection on which are

Fig. 5.

placed three pairs of complementary numbers according to the above rule. The most simple way of following this rule is to start by placing number 1 at any desired point of intersection; then by tracing out the two circles from this point, we find their second point of

intersection, on which must be placed the complementary number of 1. Accordingly we locate 2 and its complementary, 3 and its complementary, and so on until the diagram is completed.

Fig. 5 is the same as Fig. 4, differing only in the arrangement of the circles.

Fig. 6 contains the series 1, 2, 3 .... 20 arranged in five circles of eight numbers each, with totals of 84.

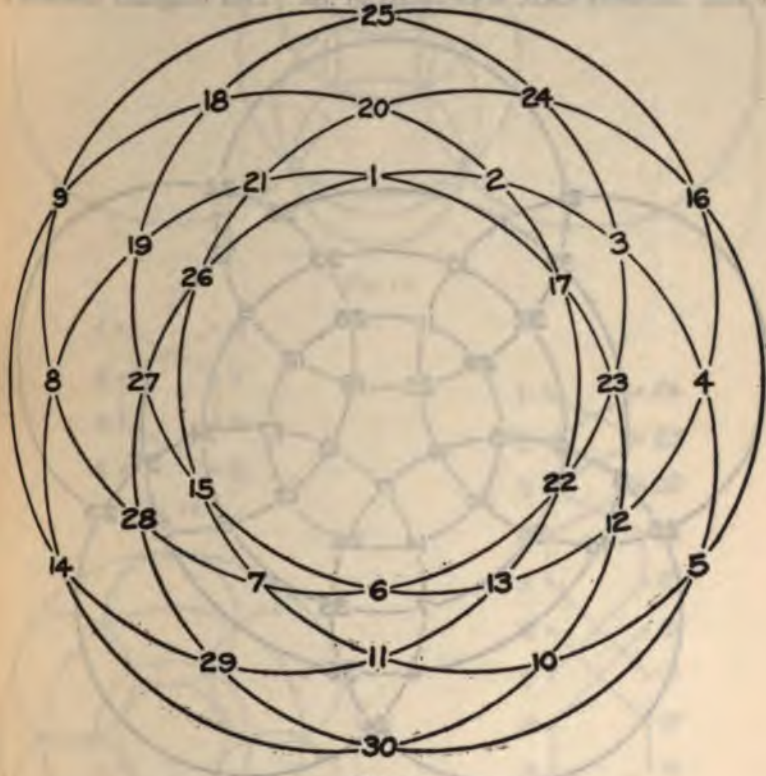

Fig. 9.

Fig. 7 contains the series 1, 2, 3....14 arranged in five circles of six numbers each, with totals of 45. It will be noticed in this diagram, that the 1 and 14 pair is placed at the intersections of three circles, but such intersections may exist as long as each circle contains the same number of pairs.

Fig. 8 contains the series 1, 2, 3....24 arranged in six circles of eight numbers each, with totals of 100.

Fig. 9 contains the series 1, 2, 3 ....30 arranged in six circles

of ten numbers each, with totals of 155. Also, if we add together any two diametrical lines of four and six numbers respectively, we will get totals of 155; but this is only in consequence of the complementaries being diametrically opposite.

Fig. 10 contains the series 1, 2, 3 ....40 arranged in eight circles of ten numbers each, with totals of 205.

Fig. 11 contains the series 1, 2, 3 .... 8 arranged in eight circles of four numbers each, with totals of 18. This diagram involves a

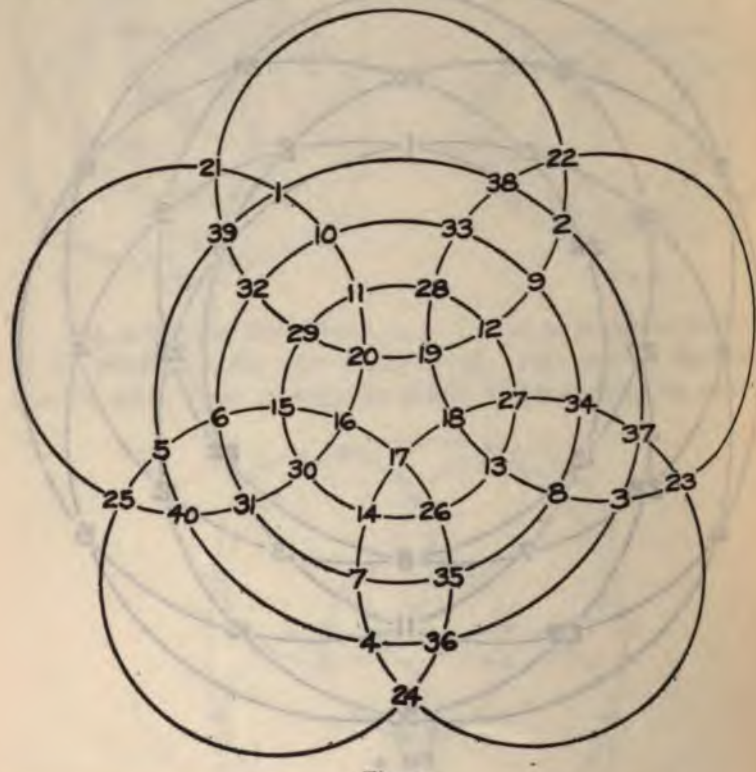

Fig. 10.

feature not found in any of the foregoing examples, which is due to the arrangement of the circles. It will be noticed that each number marks the intersection of four circles, but we find that no other point is common to the same four circles, consequently we need more than the foregoing rule to meet these conditions. If we place the pairs on horizontally opposite points, all but the two large circles ... ain two pairs of complementaries. The totals of the two

large circles must be accomplished by adjusting the pairs. This adjustment is made in Fig. 12, which shows the two selections that will give totals of 18.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14

Fig. 13 contains the series 1, 2, 3 .... 24 arranged in ten circles of six numbers each, with totals of 75. This is accomplished by placing the pairs on radial lines such that each of the six equal

circles contains three pairs. It then only remains to adjust these pairs to give the constant totals to each of the four concentric circles. Their adjustment is shown diagrammatically in Fig. 14, which is one of many selections that would suit this case.

Fig. 15 contains the series 1, 2, 3 .... 12 arranged in seven circles and two diametrical lines of four numbers each with totals of 26.

Fig. 15.

Fig. 16.

Fig. 17.

The large number of tangential points renders this problem quite difficult, and it appears to be solvable only by La Hireian methods. It was derived by adding together the respective numbers of the two primary diagrams Figs. 16 and 17, and Fig. 17 was in turn derived from the two primary diagrams Figs. 18 and 19.

We begin first with Fig. 16 by placing four each of the numbers 0, 4, and 8 so that we get nine totals amounting to 16. This

is done by placing the 4's on the non-tangential circle; which leaves it an easy matter to place the 0's and 8's in their required positions. Fig. 17 must then be constructed so as to contain three sets of the series 1, 2, 3, 4; each set to correspond in position respective to the

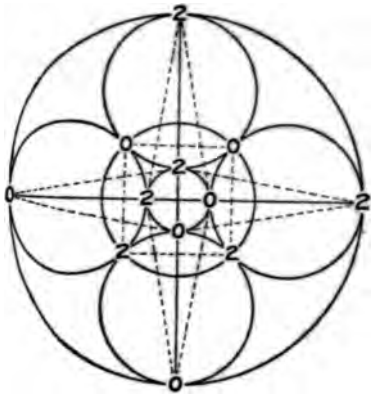

Fig. 18.

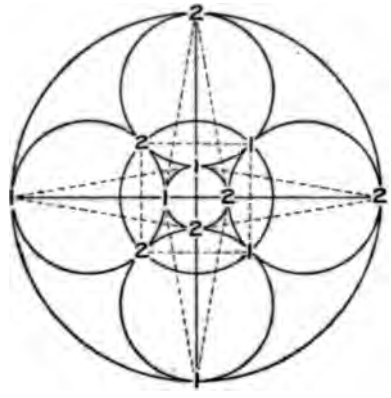

Fig. 19.

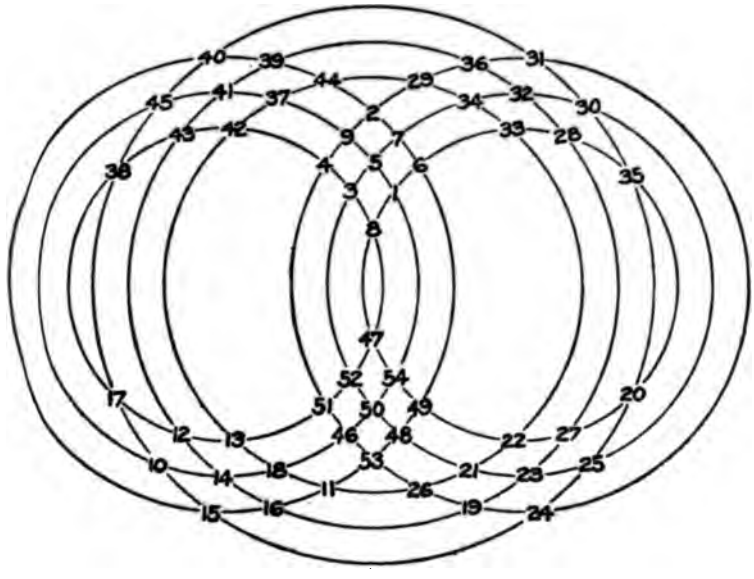

Fig. 20,

three sets in Fig. 16, and give totals of 10. This could be done by experiment, but their positions are much easier found with the two diagrams, Figs. 18 and 19. Fig. 18 contains six 0's and six 2's

giving totals of 4, while Fig. 19 contains six 1's and six 2's giving totals of 6. It will be noticed in Fig. 16 that the 0's form a horizontal diamond, the 8's a vertical diamond and the 4's a square, which three figures are shown by dotted lines in Figs. 18 and 19. Besides giving the required totals, Figs. 18 and 19 must have their numbers so arranged, that we can add together the respective diamonds and squares, and obtain the series 1, 2, 3, 4 for each diamond

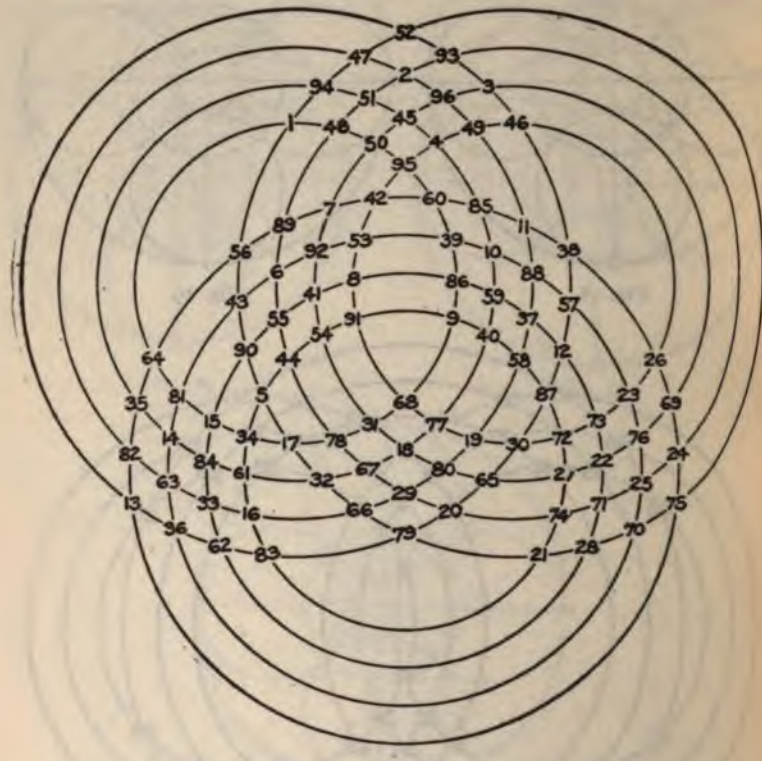

Fig. 21.

and square, which is shown in Fig. 17. Figs. 17 and 16 are then added together which gives us the result as shown in Fig. 15.

This diagram was first designed for a sphere, in which case the two diametrical lines and the 5, 6, 7, 8 circle were great circles on the sphere and placed at right angles to each other as are the three circles in Fig. 1. The six remaining circles were equal and had their tangential points resting on the great circles. The dia-

grams used here are easier delineated and much easier to understand than the sphere would have been.

Fig. 20 contains the series 1, 2, 3 .... 54 arranged in nine circles of twelve numbers each with totals of 330. The arrangement also forms six 3×3 magic squares.

1	2	3	4
4	3	2	1
2	1	4	3
3	4	1	2

Fig. 22.

0	92	44	48
44	48	0	92
48	44	92	0
92	0	48	44

Fig. 23.

0	44	48	92
4	40	52	88
8	36	56	84
12	32	60	80
16	28	64	76
20	24	68	72

Fig. 24.

We begin this figure by placing the numbers 1 to 9 in magic square order, filling any one of the six groups of points; then, according to the first general rule, we locate the complementaries of each of these numbers, forming a second and complementary

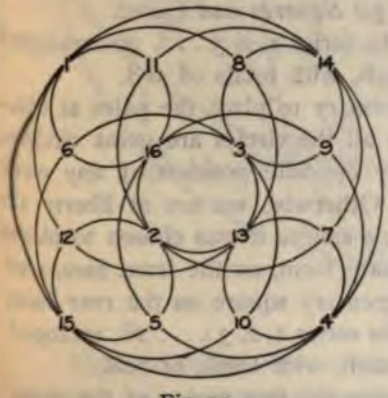

Fig. 25.

Fig. 26.

square. We locate the remaining two pairs of squares in the same manner. The pairs of squares in the figure are located in the same relative positions as the pairs of numbers in Fig. 3, in which respect the two figures are identical.

Fig. 21 contains the series 1, 2, 3 .... 96 arranged in twelve

circles of sixteen numbers each, with totals of 776. The sum of the sixteen numbers in each of the six squares is also 776. These squares possess the features of the ancient Jaina square, and are constructed by the La Hireian method as follows.

The series 0, 4, 8, 12 .... 92 are arranged in six horizontal groups of four numbers, as shown in Fig. 24, by running the series down, up, down, and up through the four respective vertical rows. the upper horizontal row of Fig. 24 is used to form the primary square Fig. 23; likewise, five other squares are formed with the remaining groups of Fig. 24. These six squares are each, in turn, added to the primary square, Fig. 22, giving the six squares in Fig. 21. There is no necessary order in the placing of these squares, since their summations are equal.

Figs. 25 and 26 show the convenience of using circles to show up the features of magic squares. The two diagrams represent the same square, and show eighteen summations amounting to 34.

MAGIC SPHERES.

In constructing the following spheres, a general rule of placing complementary numbers diametrically opposite, has been followed, in which cases we would term them regular. This conforms with a characteristic of magic squares and cubes, as described by Mr. W. S. Andrews in his book on *Magic Squares and Cubes.*

Fig. 27 is a sphere containing the series 1, 2, 3 .... 26 arranged in nine circles of eight numbers each, with totals of 108.

In this example, it is only necessary to place the pairs at diametrically opposite points; because all the circles are great circles, which necessitates the diametrically opposite position of any pair common to two or more circles. Otherwise we are at liberty to place the pairs as desired; so, in this sphere it was chosen to place the series 1, 2, 3....9 in magic square form, on the front face, and in consequence, we form a complementary square on the rear face.

Fig. 28 is a sphere containing the series 1, 2, 3 .... 26, arranged in seven circles of eight numbers each, with totals of 108.

This was accomplished by placing the two means of the series at the poles, and the eight extremes in diametrically opposite pairs on the central horizontal circle. In order to give the sphere "regular" qualities, as mentioned before, the remaining numbers should be placed as shown by diagram in Fig. 29. This shows the two selections for the upper and lower horizontal circles. The numbers for the upper circle are arranged at random, and the numbers in the

lower circle are arranged in respect to their complementaries in the upper circle.

Fig. 30 is a sphere containing the series 1, 2, 3 .... 62 arranged in eleven circles of twelve numbers each, with totals of 378.

This is a modification of the last example and represents the parallels and meridians of the earth. Its method of construction is also similar, and the selections are clearly shown in Fig. 31.

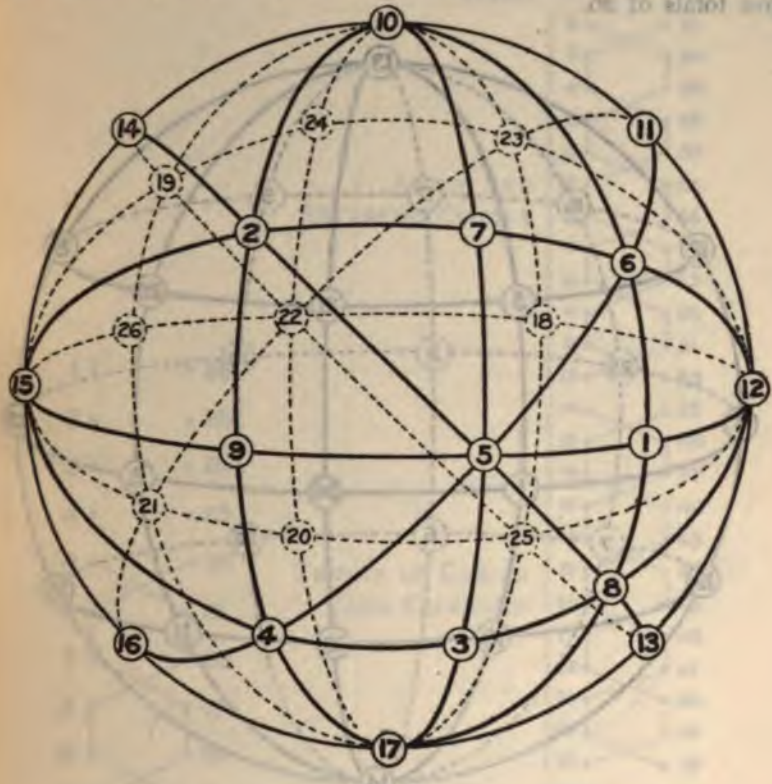

Fig. 27.

Fig. 32 shows two concentric spheres containing the series 1, 2, 3 .... 12 arranged in six circles of four numbers each, with totals of 26. It also has three diametrical lines running through the spheres with totals of 26.

The method for constructing this is simple, it being only necessary to select three pairs of numbers for each sphere and place the complementaries diametrically opposite each other.

Fig. 33 is the same as the last example with the exception that

two of the circles do not give the constant total of 26; but w
sacrifice, however, we are able to get twelve additional sum
of 26, which are shown by the dotted circles in Figs. 34, 3
36. Fig. 34 shows the vertical receding plane of eight nu
Fig. 35, the horizontal plane; and Fig. 36, the plane paralle
picture, the latter containing the two concentric circles that
give totals of 26.

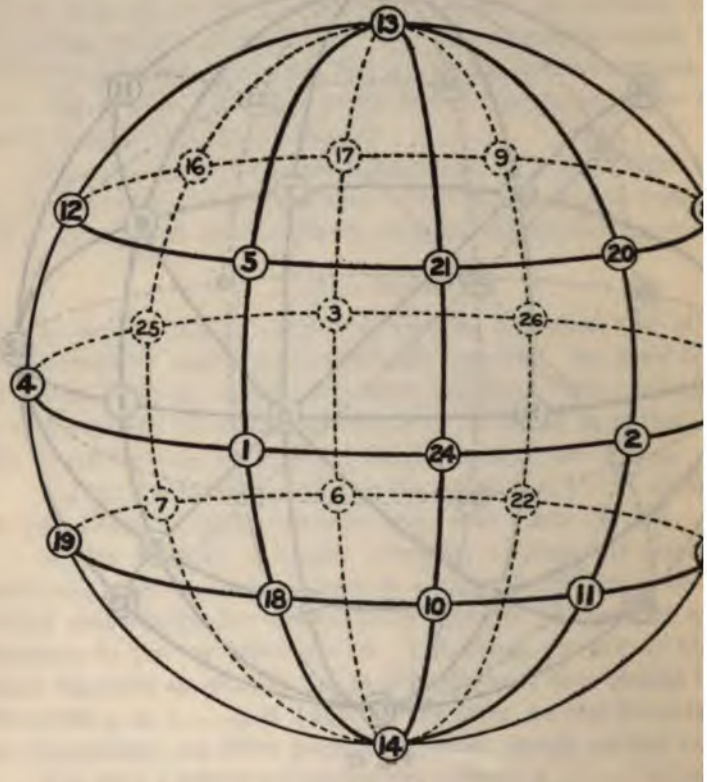

Fig. 28.

In this example all pairs are placed on radial lines wi
number in each sphere which satisfies the summations of the
dotted circles. The selections for the four concentric circl
shown in Fig. 37. The full lines show the selections for F
and the dotted lines for Fig. 35. It is impossible to get c
totals for all six concentric circles.

Fig. 38 is a sphere containing the series 1, 2, 3 ....

anged in fifteen circles of sixteen numbers each, with totals of 792. t contains six 3×3 magic squares, two of which, each form the ucleus of a 5×5 concentric square. Also, the sum of any two dia- netrically opposite numbers is 99.

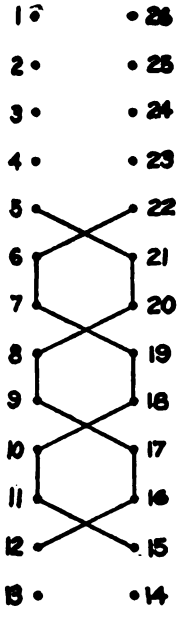

Fig. 29.

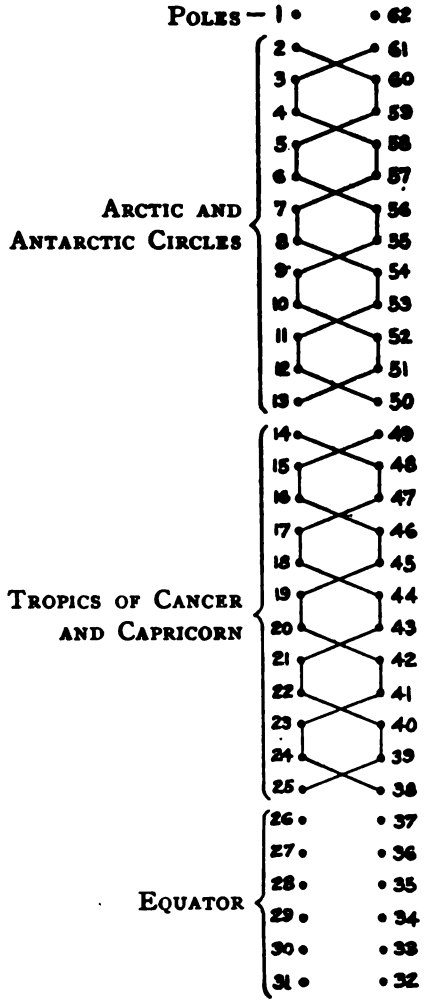

Fig. 31.

To construct this figure, we must select two complementary ts of 25 numbers each, that will form the two concentric squares;

and four sets of 9 numbers each, to form the remaining squares, t four sets to be selected in two complementary pairs.

This selection is shown in Fig. 39, in which the numbers e closed in full and dotted circles represent the selection for the fro and back concentric squares respectively. The numbers marked wi T, B, L and R represent the selections for the top, bottom, left a right horizon squares respectively.

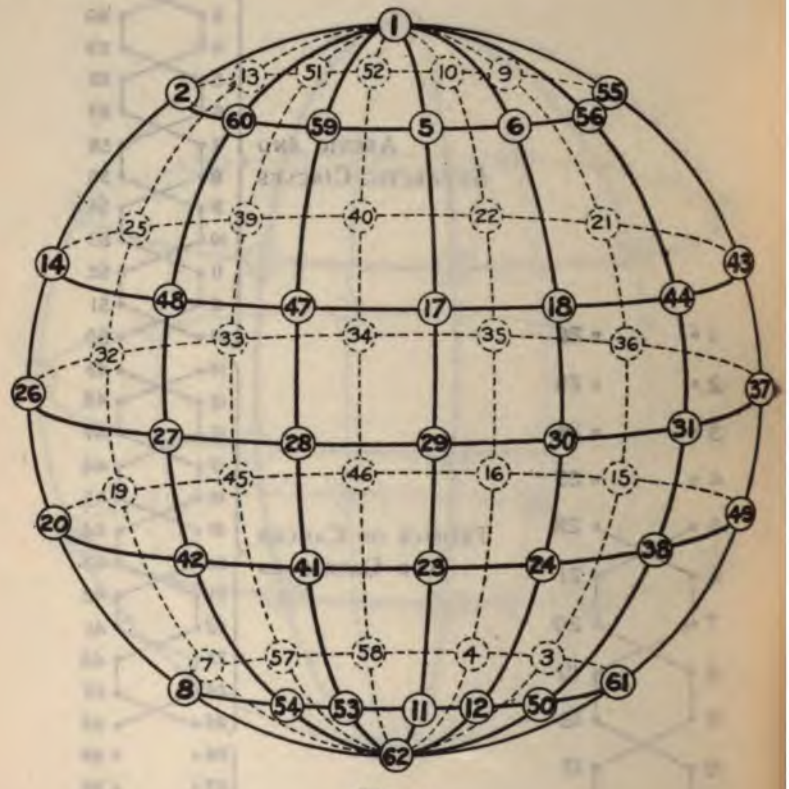

Fig. 30.

After arranging the numbers in the top horizon square, we locate the complementary of each number, diametrically opposite and accordingly form the bottom square. The same method is used in placing the left and right square.

The numbers for the front concentric square are duplicated in Fig. 40. The numbers marked by dot and circle represent the selection for the nucleus square, and the diagram shows the selections

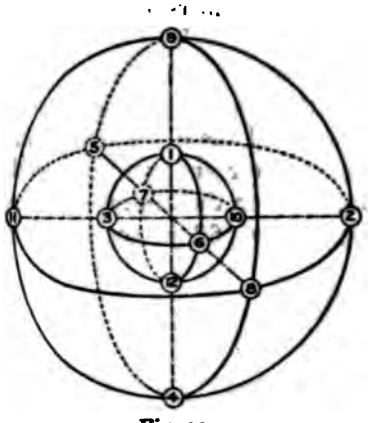

Fig. 32.

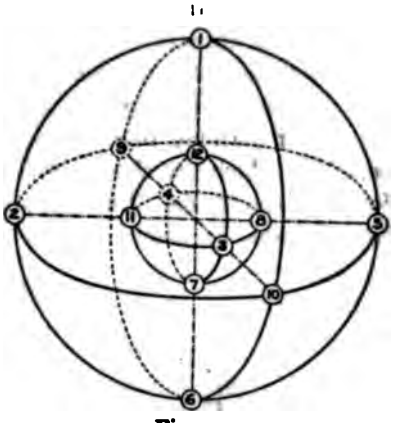

Fig. 33.

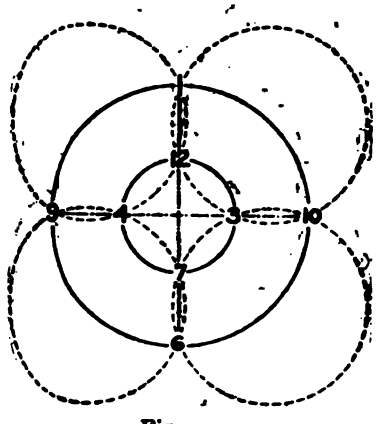

Fig. 34.

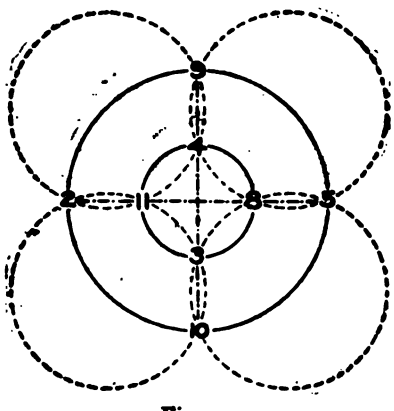

Fig. 35.

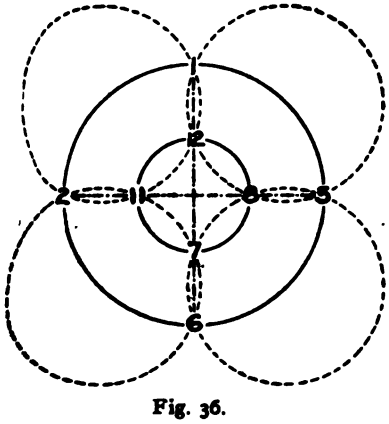

Fig. 36.

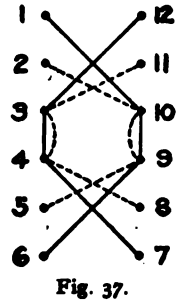

Fig. 37.

for the sides of the surrounding panel, the numbers 4, 70, 34 and 4 forming the corners.

By placing the complementaries of each of the above 25 nun bers, diametrically opposite, we form the rear concentric square.

After forming the six squares, we find there are twelve nur bers left, which are shown in Fig. 41. These are used to form t four horizon triads. Two pairs are placed on the central circle, an by selection, as shown in the diagram, we fill in the other tw

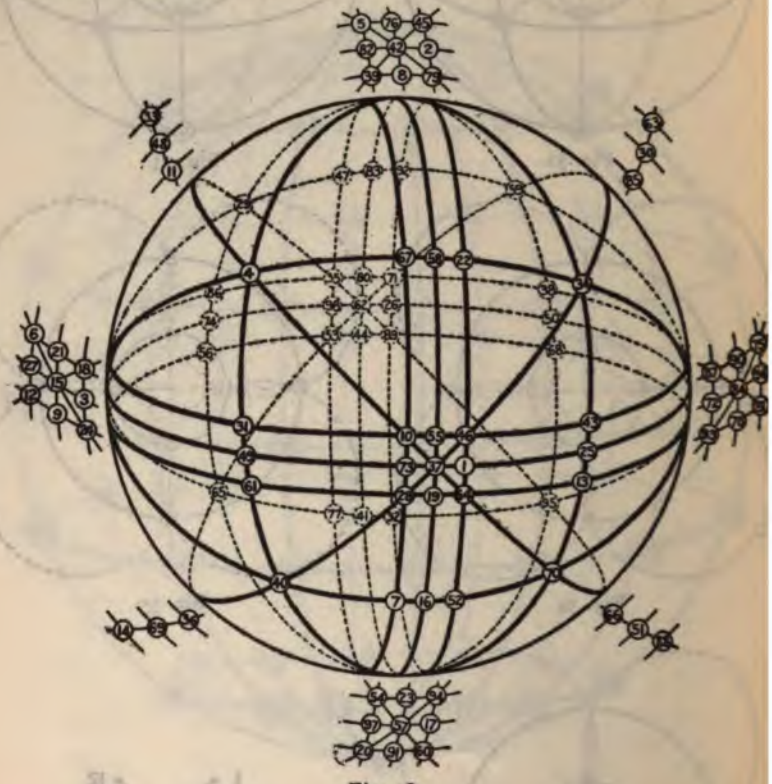

Fig. 38.

circles with complementary numbers diametrically opposite. The above selection is such that it forms two groups of numbers, each with a summation of 198; this being the amount necessary to complete the required summations of the horizon circles.

There are many selections, other than those shown in Fig. 39, which could have been taken. A much simpler one would be to select the top 25 pairs for the front and back concentric squares,

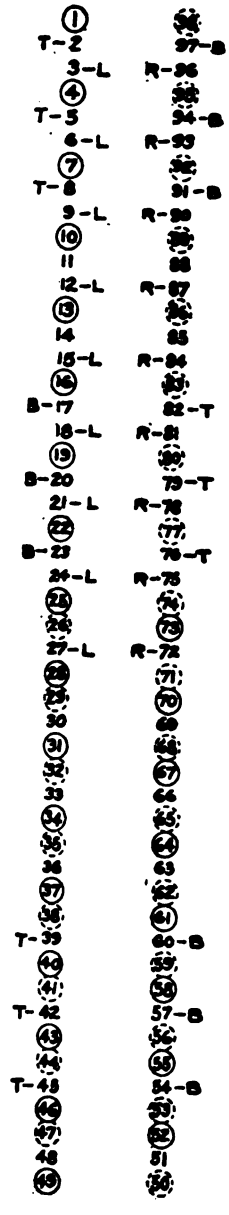

Fig. 39.

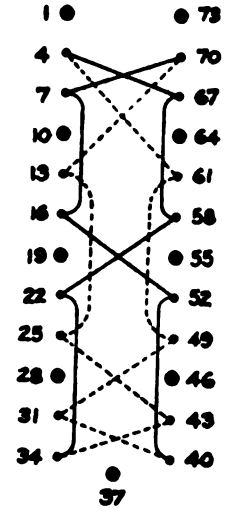

Fig. 40.

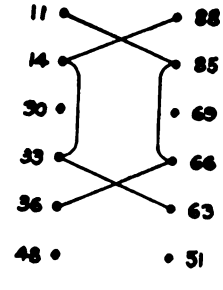

Fig. 41.

the next 9 pairs for the top and bottom squares, the next 9 pairs for the left and right squares, and the remaining 6 pairs for the triads. In such a selection, all the numbers in each square would be in sequence.

HARRY A. SAYLES.

SCHENECTADY, N. Y.

THE ESTABLISHMENT OF THE CRIMINOLOGICAL INSTITUTE IN ST. PETERSBURG.

On the 24th day of January, 1908, a new institution of learning, the Criminological Institute, was opened in St. Petersburg. It can be regarded as the first sprout of the young science of criminology with its related philosophical and sociological branches of knowledge.

This newly established institution, a branch of the Psycho-Neurological Institute, should be named the "Bechterew" Institute,[1] since it was called into life through the indefatigable energy and creative power of the President of the Psycho-Neurological Institute, the academician W. M. Bechterew.

Through the wicked irony of fate, the idea of founding a criminological institute was carried into effect, not in Western Europe, where it had been presented by many competent adepts and was often the topic in International Congresses, but, horrible to relate, with us in Russia, and even at a time when there were hanging over the Russian universities political clouds of a threatening nature.

In this sense, the founding of the Criminological Institute in St. Petersburg is very instructive. This fortunate and symptomatic event shows that dark powers which usually chill social self-activity were not able to smother the impulses of creative mind and personal initiative.

The Criminological Institute of St. Petersburg is the first private institution in the world of this kind, and its founding is due to Professor Bechterew alone.

But an alliance of criminologists, Professors List of Berlin, Prince of Brussels, and Van Hammel of Amsterdam, formed in 1880 (the Russian group in this alliance was formed in 1899), was similar in its leading ideas to the Russian Criminological Institute. Although this alliance had for its task the study of crime as a social evil, yet

[1] The well-known zoologist, Prof. W. A. Wagner, was the one to suggest this name.

Professor Bechterew finds this tendency, so to speak, only a quiet acquiescence, but in no sense a declaration of the principle, which in the field of criminal science makes the dogmatic and subjective method the principal one and in this sense seeks to reconcile the anthropological, sociological and juristical schools, and, therefore, is called the eclectic school.[2]

Under such conditions, the work of the International Criminological Alliance must consist, not so much in the many-sided scientific treatment of the fundamental principles of criminology, as in ascertaining rational measures to combat growing criminality in the population. This last feature of the International Criminological Alliance indicates, in spite of outward similarity to the work of the Criminological Institute, a great difference between the two.

As the president of the Psycho-Neurological Institute has kindly placed at my disposal the material to be used, I will endeavor to point out in cursory lines the salient factors in this new growth of criminology.

The Criminological Institute in St. Petersburg, however strange it may sound, was not established by the criminologists, but by the well-known Russian psycho-neurologist, the academician, W. M. Bechterew. He is a keen observer in the field of experimental psychology and an earnest opponent of the dominant subjective school, and has laid a solid scientific foundation for the new so-called Objective School of psychology. This is shown in a series of his published works.

The new Objective School substitutes for the juristical dogmatic method of criminal law a new method, namely, the objective psychological method which treats the soul of the criminal, not after the analogy of the soul of a normal social being, but as an objective psychological phenomenon, entirely independent of the subjective consciousness of the criminal.

Starting from this point of view, the academician, W. M. Bechterew, proposed to the Council of the Psycho-Neurological Institute (on January 12, 1908) to found upon their institute an independent Criminological Institute. Recently Professor Bechterew, in a report upon this question, said, "There is manifest in the learned world a very earnest desire to investigate fundamentally the criminal world." From a report of Arthur MacDonald, of Washington, D. C., to the Amsterdam Congress of Criminal Anthropology, it was

[2] W. M. Bechterew: "The Objective-psychological Method" (citation by me from manuscript of author).

learned that a criminological institute had already been established in the Argentine Republic.

In order to meet an urgent need that had long since been felt not only in scientific but in social life, Arthur MacDonald proposed the establishment of an International Criminological Institute. It was very desirable to found such a special criminological institute upon the Psycho-Neurological Institute. This proposition was favorably considered by the Council of the Psycho-Neurological Institute. A special commission was appointed to work out the question concerning the establishment, program and regulations of the new institution.[8]

This commission consisted of the following professors and docents of the Psycho-Neurological Institute: W. M. Bechterew, the President; M. M. Kowalewsky, D. A. Dril, S. K. Gogel, W. N. Speransky, A. L. Tschegloff, S. O. Grusenberg, A. T. Gribojedoff and L. G. Orschansky. These specialists in a series of meetings worked out the fundamental rules and plan of scientific work for the new institute.

The following fundamental propositions were decided upon:

The first work of the Criminological Institute as a special institution of learning, must consist above all things in a broad, scientific study of crime, and of those social and economical factors which this abnormal phenomenon of the social life calls forth. Further, says Bechterew, "the Criminological Institute must provide for a fundamental systematizing of the scientific material, which explains the problem of criminality. And for this reason the causes which generate and nourish crime must be investigated and the most useful means for rational combat against growing criminality must be found. Systematic research in the field of criminal anthropology and physiological psychology must not be neglected. In order to come in closer touch with criminals and thereby to become better acquainted with their peculiarities, it would be very desirable for the professors of the Institute to obtain permission to enter the prisons. Also it would be very useful to make observations upon the criminal youth who are pupils in the agricultural colonies."

[8] An article by Arthur MacDonald, entitled "Plan for the Study of Man," was published by the Imperial Academy of Sciences of St. Petersburg in its Bulletin for February, 1908, pp. 136-143. This article is developed in its details in two Senate Documents, one entitled "Man and Abnormal Man," and the other "Juvenile Crime and Reformation, Including Stigmata of Degeneration." These documents might be obtained gratis through any U. S. senator or representative, or by sending the nominal prices (40 and 25 cents) to the Superintendent of Documents at the Government Printing Office.—Tr.

Prof. D. A. Dril, an earnest defender of the doctrine that crime is a product of the social organism and the social conditions in which the criminal lives, finds that the study of the problem of criminality without previous investigation of the social phenomena, which generate it, is impossible. The coming science in western Europe, the study of pauperism, is concerned with various investigations of the surroundings of the poorest classes in the population which are productive of much crime. "Up to the present time," says Prof. D. A. Dril, "the criminal has been considered by the learned from two different points of view: the natural history, which regards the criminal as a being in and for himself without any relation to society; and the sociological, which directs its attention solely to the relation of the criminal to society and entirely ignores him as an independent personality with special psychical structure. The main work of the Criminological Institute should consist in supplysing these deficiencies by the study of the mind of the criminal."

The director of the agricultural colony for young criminals, M. P. Bekleschofp, emphasizes the importance of observation of these criminals by their teachers as valuable material for study, and he desires to organize special courses for the teachers in the houses of correction.

Professor Tschigloff also spoke favorably of the early foundation of a criminological institute in St. Petersburg and proposed that a special commission have charge of working out the details and regulations of such a school.

After long conferences as to the program for the Criminological Institute the members of the commission, on the 17th of April, 1908, came to the following conclusion: The new scientific institution, the Criminological Institute, must have as its principal work a many-sided and thorough study of the criminal himself as well as of his outward surroundings, which lead to crime, and must strive to find rational methods for lessening crime.

This resolution was approved by the Council of professors of the Psycho-Neurological Institute, and thus the question of establishing a criminological institute in St. Petersburg was solved.

In order that the professors of the Institute might have easy access to the prisons, the commission (in its meeting of May 13) decided to make this request of the Minister of Justice, which was subsequently granted.

In order to raise the educational standard of those teaching juvenile criminals, the commission of professors decided to request

the Council of the Psycho-Neurological Institute to found courses of instruction for teachers in houses of correction.

SIMEON GRUSENBERG.
PSYCHO-NEUROLOGICAL INSTITUTE OF ST. PETERSBURG.

The following subjects will be treated in the Criminological Institute: (1) History of crime; (2) Criminal sociology; (3) The combat against crime; (4) Criminal law; (5) The doctrine of judicial tribunals on criminal law; (6) History of juridical political doctrines; (7) Comparative history of law; (8) History of economical doctrines; (9) Legal medicine; (10) Criminal anthropology, and psychology of crime; (11) General psychopathology; (12) Forensic psychiatry; (13) Pathological psychology; (14) Hypnotism and doctrine of suggestion.

BOOK REVIEWS AND NOTES.

ANTI-PRAGMATISM. An Examination Into the Respective Rights of Intellectual Aristocracy and of Social Democracy. By *Albert Schinz*. Boston: Small, Maynard & Co., 1909. Pp. 317.

The Monist has published an analysis of the French edition of this book, in the July number, 1909, pp. 474-475. Its author, now Associate Professor of French Literature in Bryn Mawr College, was formerly "Professeur agrégé de philosophie" at the University of Neuchâtel. The English edition contains some new features: (1) A "warning" in which the author asks his readers to remember that he does not attack a pragmatic conception of life, but only a pragmatic philosophy. (2) The author has taken the trouble in many cases to refer to other philosophers who simultaneously with him had addressed objections to pragmatists similar to his own (e. g., Bakewell, Carus, Creighton, Hibben, etc.) and to emphasize the unanimity of critics on both sides of the ocean. (3) In an Appendix: "Answer to Various Criticisms," Mr. Schinz begins by exposing the comfortable *argument of silence* so profusely used by pragmatists. They have been accused repeatedly of ignoring the criticisms directed against them by simply declaring that others did not understand them, or refusing to see the real point at issue. They say that pragmatism is not subjectivism, but they do not prove it. All their opponents agree on that point; therefore Mr. Schinz asks whether it is not perhaps "the pragmatists who refuse to see the point at issue." Mr. Schiller (in *Mind*) has protested against the dilemma of the author of *Anti-Pragmatism*, viz., either pragmatism recognizes the rights of reason, and then it is not different from any philosophy; or it does not recognize those rights, then it has a right to the claim of being a new philosophy, but because it is irrational—is false. Mr. Schinz maintains his position by new quotations from Schiller's books. Mr. Schinz replies to those who accuse him of considering pragmatism as a low sort of utilitarianism. He also meets the question of Naville of Geneva: If science is bad morally for the masses, why should it not be bad for the intellectual aristocracy also? Finally to those who tell him that his viewpoint is not anti-pragmatic but hyperpragmatic (Paulhan, Compayre, Faguet, Schiller) the author says that for him pragmatism as a social doctrine is not bad, but philosophically it is false. We find that truth is morally bad; why then should we not, for the benefit of humanity, preach something better, which is *not* true? For pragmatists good and true agree; for Mr. Schinz they do not.

all our so-called truths are of necessity merely errors making in the direction of that universal truth which can never be attained but once, and once attained, cannot endure. But—and this is to be well noted—once this truth is supplanted by error, this error can have no other goal than universal truth. ....As with truth, so with happiness, which will be found to be indistinguishable from truth. It will be shown that, did we once attain happiness, our chief concern would be lest it should endure,—i. e., if we could have any concerns when we had attained absolute truth."

The philosophy of change is set forth in the first three chapters which fill more than half of the book, while six short chapters are intended to define the general trend of the theory and the probable consequences of its adoption by mankind.

FRIEDRICH NIETZSCHE DER UNZEITGEMÄSSE. Von *Karl Knortz*. Annaberg: Graser, 1909. Pp. 93.

While Professor Knortz believes that Nietzsche lived in advance of his times, that the world was not yet ripe to grasp the lofty concept of the superman, yet the chief merit he claims for the philosopher of immorality is the comparatively modest one of having greatly aroused the interest of educated men in philosophical questions. The introduction of the present work sets forth Nietzsche's right to rank as a philosopher, and the three following chapters are devoted to his relations with Strauss, Wilhelm Jordan and Wagner. Then the author discusses Nietzsche's attitude with regard to pity, religion, the state in its relation to the individual and the criminal, and of course also his theory of the superman. One valuable service which Professor Knortz renders to students of Nietzsche in this publication, is the compilation of a very thorough Nietzsche-bibliography containing more than two hundred titles of articles and books in German, French, English and Italian.

Hans Pichler has published an essay *Ueber die Erkennbarkeit der Gegenstände* (Vienna: Braumüller, 1909). The author states that the systematic data are based analytically upon the question of the conditions of cognition. After the book had gone to press he discovered that Christian Wolff had already said much of what there is to say with regard to the knowability of objects, but he considers his own work as an introduction to Wolff's theory.

Thinking that Wolff's attempts to establish a science of objects have not been duly appreciated hitherto, Mr. Pichler follows this work with a critical presentation of Wolff's ontology (*Ueber Chr. Wolffs Ontologie*. Leipsic: Dürr, 1910. Price 2 m.).

The January number of the *Archiv für Rechts- und Wirthschaftsphilosophie*, the organ of the International Association for the Philosophy of Law and Industry (editor, Dr. Josef Kohler of Berlin) contains an announcement of the 1910 meeting of the Association, and gives a provisional program and a history of the members. A recent interesting supplement to the *Archiv* is by Dr. Eugen Sulz on *Hegel's philosophische Begründung des Strafrechts* and another by Dr. R. Slawitschek of Prague bears the title *Beiträge zur öffentlichrechtlichen Begriffskonstruktion.*

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THE MONIST

TRUTH.

THE WORD "TRUTH" IN EUROPEAN LANGUAGES.

THE words *true, truth, troth, trust, truster, trustee, truce,* etc., are derived from an old Teutonic root which appears also in the modern German words *treu,* "faithful," *trauen,* "to have confidence," and also *Trost,* which means originally "rest" or "assurance," then "reliance," and finally "comfort" or "solace."

The noun *truth* is formed from *true* by the ending *th* in the same way as *wealth* from *weal* (prosperity), *health* from *hale* (sound), *dearth* from *dear* (scarce), and *hearth* from a word now lost corresponding to the Gothic *hauri* and Icelandic *hyrr* meaning "coal," a "cinder" or "ember."

By "truth" we generally understand the trustworthiness or reliability of an idea. According to the etymology of the word, truth is that which endures, that which continues to remain the same, that which stands the test and is not subject to change.

The German words *wahr* and *Wahrheit* are most probably derived from the root WAS, the infinitive of which in Old German is *wesen,* "to be," "to exist." Derivatives of this root are preserved in the English "was" and "were." The German word *wahr* must originally have denoted ac-

tual existence, and then acquired the meaning "true" in the sense that what we think is, actually exists.

The English word "worth" as well as its German equivalent *Wert* are probably connected with the same root from which *wahr,* "true," is derived. It means originally the quality of having substance or reality, that which is *wahr* or truly being; that which is reliable, because it endures.

The German word *wahr* has no direct connection with the Latin *verus*; at any rate it is not derived from it, for it existed among the Saxons as well as the Germans and other Germanic nations before Roman civilization began to influence northern Europe; but it is not impossible that *verus* is derived from the same root, WAS, which is common to all the Indo-Germanic nations.

In Anglo-Saxon, the word *war,* "true," meant the same as the German *wahr,* but it was replaced in English by "true," the German *treu,* meaning faithful. Judging from the Gothic word *tuzwers,* "doubtful," the Goths must also have had the root of the German *wahr*; it was presumably pronounced *wers,* but at the time of Ulfila the term *sunjis* ("true," the root of which is SA or AS, as it appears, for instance, in the German *sein* and in *asmi,* εἰμι, *sum* and *am*) was used in its stead.

If we attempt to reproduce the Gothic *sunjis* in modern German, we might render it *seinig,* analogous to an English formation, *be-ish.*

The German affirmation *ja,* "yes," and its English equivalent *yea* mean "it is true" and are derived from a root which appears in the Old-High-German verb *jēhan,* "to own, to confess, to profess." In Old-Saxon it reads *ja* and in Anglo-Saxon *geâ* or*gê-swâ,* the latter being an amplification meaning "yea thus" or "yea so," and was contracted into *gêse,* from which the modern word *yes* is derived.

The root of *jēhan* appears also in the German word *Beichte,* "confession," which is derived from the verb *be-jēhan,* or later *be-ichten.*

How far *ja* is connected with *je* (Old-High-German *ie*) is doubtful.

The word *ie* or *iwe* (English *ever*) is preserved in the German *je* and *ewig,* "eternal." The same root has produced the German *Ehe,* "marriage," denoting the alliance between husband and wife destined to last forever. In Greek the word αἴων, an unlimited long period, is etymologically the same as the German *Ehe.* The *h* in *Ehe* corresponds to a digamma (pronounced *v*) in the old Greek *aivon* as well as the German *ewig,* but it disappears in the Attic pronunciation of the Greek αἰων, as well as in its English derivative "eon."

The German *wahren,* "to guard" and *währen* (the latter etymologically the same as the English "wear" in the sense "to last," "to endure") are also kin to *wahr,* but here the idea of existence has been changed to that of persistence.

How far, and whether at all, the old Slovenian word *vera,* "faith," and the Irish *fir,* "truth," are etymologically related to the Teutonic word *war,* "true," or the root WAS, "real," is doubtful.

In Greek the word ἀλήθεια means that which is not hidden, that which can be beheld unconcealed, that which is not masked, or does not put on a false show.

In the Slavic languages truth is called *pravda* (in Polish spelled *prawda*) and in Croatia it is called *istina.*

The Hungarian word for truth is *igaz,* and from this same root are derived a number of other words, such as *igazsag,* literally "truthhood," denoting "justice," *igeret,* "promise," and *igen,* "yes" or "yea."

In addition there exists a special word *ige* which means truth in a religious sense and denotes especially the scrip-

tures, or the Bible, or the word of God. Since Hungarian is a non-European language, the roots of which are different from any Aryan speech, it is difficult to trace the original meaning of these words, but the several derivatives prove that the original meaning can not be much different from their English equivalents, true, truth, troth, and yea or yes, "it is true," as an affirmation.

THE HEBREW, THE EGYPTIAN AND THE CHINESE NOTIONS OF TRUTH.

In Hebrew there are several words denoting truth, but all of them denote what will last or will stand inquiry. The words *'omen* as well as *emeth* are derived from verbal stems which mean "to be firm."[1] The former verb *aman* has entered into the New Testament and thence into all modern languages in the shape of *Amen*, "verily," which literally means "it stands firm," or "it is true."

Netsakh[2] means originally glory, brightness, then lastingness and truth, while the affirmation *yetseb* is used to denote that which will stand in court, being derived from *yatzab*.[3]

The Chaldee word *Qeshot*,[4] "truth," is derived from *Qashat*, "to divide evenly," "to make equal," "to measure off rightly," and is connected with words meaning a pair of balances and weights. The underlying idea of the conception is the determination of exact measure.

* * *

In Egyptian truth is called *Ma'at*, represented as a goddess with an ostrich feather, a figure which is different from all other gods in so far as she plays no part in mythology, except that she is called the daughter of Ra, the Sun-

[1] The word אֱמֶן is derived from אמן, "to be firm," and אֱמֶת from אמת, "to be stable."

[2] Two forms, נֶצַח and נֵצַח, are in use, both being derived from נצח.

[3] יָצָב from יצב, "to stand in court."

[4] הַשְׁוֹט, truth, and קְשִׁיטָה, weight, are both derived from הִשְׁט.

god, and is commissioned with weighing the heart of the soul in the underworld before the throne of Osiris. Otherwise she is the personification of truth and right, but the

HORUS WEIGHING THE HEART IN THE UNDERWORLD.*

ANCIENT BREASTPLATE REFERRED TO IN TEXT.

A GOVERNOR OF RAMESES IX.
From Erman, *Life in Ancient Egypt.*

THE GODDESS MAAT.
From Budge's *Mummy*, p. 29.

abstract idea of the term has been and has always remained uppermost in the minds of the Egyptian people. She is

* In the scale is the hieroglyphic for truth.

also spoken of in the dual form *ma'ati*, "the two truths," as the goddess who attends to both punishments and rewards.

The goddess Ma'at is repeatedly mentioned in the oldest extant Egyptian inscription which praises King Unas because "he loved truth (*maa*)... and the double truth (*maati*) has heard him...the double truth has given command to let him pass through the realm of Seb, and to make him rise at his pleasure....And Unas cometh forth on this day as the fruit of the truth (*maa*) of a living soul ...Unas cometh forth according to the truth, which brings him his desire."

The adjective *maa* means "straight" or "level," then "right" or "due," and also "genuine" or "real."

The emblem of Ma'at is the ostrich feather. As a goddess Ma'at is the patron of justice, and it is reported that the chief judge wore her picture on a chain upon his breast. The breastplate here reproduced shows Ma'at and the hawkheaded Ra, seated on either side of an obelisk. The picture of a governor under Rameses IX shows him in his capacity as a judge, holding the ostrich feather of truth in his left hand.

* * *

The Chinese word for "truth" is 眞 *chan*, which is a compound of the two characters 人 *jan*, "man," and 直 *chih*, "upright." The character *jan* appears in the two strokes underneath the word *chan*. The word "upright" is a compound of three radicals, which are 十 *shih*, "ten," 目 "eye," and L an abbreviation of 隱 *yin*, which means "hidden." The whole compound character is explained in the Chinese dictionaries as "ten eyes see the hidden." The word "ten" also means "perfect" or "complete," and so it might as well mean, "a perfect vision of the hidden."[5]

[5] The character *chan*, "truth," is found in Chinese dictionaries under the radical No. 109, meaning "eye," as accompanied by five strokes.

As the character *chan*, "truth," now reads, the radical *shih*, "ten," on top of the old way of writing *chan*, is replaced by the radical No. 21, 匕 *pi*, "ladle," in the sense "to compare" or "to change," and in this form the word is explained according to the Taoist notion as referring to the changes which spiritual beings or fairies undergo. In explanation of this view we must state that under the influence of mysticism the "true man" has come to denote first a purely spiritual person, then a magician who can change his shape at will.

The adjective "truthful" in Chinese is 信 *sin*, and the character consists of 人 "man" (in compounds on the left side written thus 亻), and the word 言 *yen*, the latter being composed of 口 "mouth" and four strokes above it, meaning "what comes out of the mouth." The whole character "truthful" accordingly depicts "a man standing by his word," a pictorial description than which certainly no better could be invented.

A DESCRIPTION OF THE NATURE OF TRUTH.

Before we enter into further explanations of the significance of truth we will hear what philosophers have said about it, how they define it and what they think about it.

But since many of their statements are vague and unclear, it will render a review of their definitions easier if we know the state of things which suggested the coinage of the word. It is advisable for this reason that we understand exactly why and how the word originated and what we ourselves mean by truth. If we are clear ourselves we shall the quicker see what our predecessors intended to say even when they missed the point or could not find the right expression.

The need of communicating our intentions, our requests and our ideas concerning things has produced language; but incidentally while this purpose is fulfilled, lan-

guage accomplishes a task which grows in importance; it clarifies the mind, it begets abstract ideas and thereby produces that order in the methods of thought which is called reason. The speaking animal becomes a rational being.

All speech is representative. Every word stands for something, and every sentence either is itself a declaration or implies one. Every statement refers to some object of thought which may be anything or of any kind and need not be a bodily and concrete object. It may be a mere relation and even, as in mathematics, a purely mental conception, or the product of a mental function.

A declaration may describe its object of thought correctly or incorrectly, appropriately or inappropriately, with exactness or inadequately. In the former case it is called true; in the latter false, erroneous, untrue or incomplete.

When we ask what truth means, we must first bear in mind that truth always refers to a statement made concerning some fact. If the statement describes the fact as it is, it is called "true." We do not speak of facts as being true; facts are either "real" or "unreal." The existence of the chair, the table, the pen is not called "true," but the statement that the chair on which I sit, or the table on which I write, has four legs, is either "true" or "untrue." A statement, as a rule, can be verified. We can count the legs of the table, and if we count to four we say, "It is true that the table has four legs."

Truth accordingly consists in a relation. There is a subjective statement and an objective condition of things. Truth means that the former properly describes or represents the latter. If I investigate and find my expectations fulfilled, I call the statement true, and this correspondence, this congruence of thought and thing, is called truth.

THE PHILOSOPHERS OF CLASSICAL ANTIQUITY.

A review of philosophical definitions of truth must naturally be very incomplete, because not every philosopher has left a succinct exposition of the subject, and what we have to offer here is practically a mere compilation of extracts made from the history of philosophy, having no other merit than that they furnish a brief synopsis of various views and explanations.

We will introduce our collection with a quotation from the literature of the Old Testament Apocrypha, which is not a definition but an appreciation of truth. It is not philosophical but religious and reflects in general and emotional language the reverence in which truth is held by mankind. We read in 1 Esdras, iv. 38-40:

"As for the truth, it endureth, and is always strong; it liveth and conquereth for evermore.

"With her there is no accepting of persons or rewards;[*] but she doeth the things that are just, and refraineth from all unjust and wicked things; and all men do well like of her works.

"Neither in her judgment is any unrighteousness; and she is the strength, kingdom, power, and majesty of all ages. Blessed be the God of truth."

By turning from the Jewish literature to Greek philosophy we must regret the absence of any definition of truth among the oldest thinkers, since, with the exception of a few extracts, quotations and general characterizations, their writings have been lost.

The oldest Greek philosopher whose definition of truth has been preserved is Parmenides of Elea. He was born about 515 B. C., flourished in the beginning of the fifth century and must have been advanced in years in the time of Socrates. He was the philosopher of pure being to whom reality appeared as merely phenomenal, and ac-

[*] In the place of "rewards," the word "privileges" would perhaps better convey the meaning of the text.

cording to him truth consists in the knowledge that being is and not-being cannot be. The error accordingly arises through the belief that not-being exists. This view of Parmenides is preserved in a passage repeatedly quoted. which according to Proclus in his commentary on Plato's Timaeus (II, 105 b) reads thus:[7]

"Listen and I will iustruct thee—and thou, when thou hearest, shalt ponder,
One path is: That Being doth be, and Non-Being is not;
This is the way of conviction, for Truth follows hard in her footsteps.
The other path is: That Being is not, and Non-Being must be;
This one, I tell thee in truth, is an all-incredible pathway.
For thou never canst know what is not (for none can conceive it)
Nor canst thou give it expression, for one thing are Thinking and Being."

We must remember that Parmenides identified pure existence with the absolute conception of pure being, thus identifying existence with pure thought. Plotinus quotes from him, "For one thing are thinking and being," which is thought to belong at the end of the passage just quoted, and has therefore been included with it.

Plato was greatly influenced by Parmenides and reconciled his views with the philosophy of Heraclitus, whose system is characterized by the phrase πάντα ῥεῖ, "Everything is in a flux." Plato's view of truth is condensed by Ueberweg as follows:[8]

"Plato opens the exposition of his physics in the *Tim.* (p. 28 *et seq.*) with the affirmation that since the world bears the form of γένεσις (development, becoming) and not that of true being (οὐσία) nothing absolutely certain can be laid down in this field of investigation, but only what is probable (εἰκότες μῦθοι). Our knowledge of nature bears not the characters of science (ἐπιστήμη) or of the

[7] The passage as quoted here is translated from Mullach's *Fragmenta Philosophorum Graecorum* by Thomas Davidson in the *Journal of Speculative Philosophy*, Vol. IV, No. 1 (January, 1870).

[8] *History of Philosophy*, New York, Scribners, 1903, I, 125.

knowledge of truth (ἀλήθεια), but those of belief (πίστις). Plato says (*Tim.*, p. 29 c): "What being is to becoming, that is truth to faith" (ὅ τι περ πρὸς γένεσιν οὐσία, τοῦτο πρὸς πίστιν ἀλήθεια). What Plato says in the *Phaedo*, p. 114 d, explains his idea of the probable: 'Firmly to assert that this is exactly as I have expressed it, befits not a man of intelligence; yet that it is either so or something like it (ὅτι ἢ ταῦτ' ἐστιν ἢ τοιαῦτ' ἄττα) must certainly be assumed.'"

Aristotle's definition of truth commends itself more than Plato's to the scientist, and has been summed up by Ueberweg thus (*op. cit.*, I, 152):

"Truth in a logical judgment is the correspondence of the combination of mental representations with a combination of things, or (in the case of the negative judgment) the correspondence of a separation of representations in the mind with a separation of things; falsity in judgments is the variation of the ideal combination or separation from the real relation of the things to which the judgments relate."

Further down Ueberweg says concerning Aristotle:

"Truth in knowledge is the agreement of knowledge with *reality* (*Categ.*, c. 12: τῷ γὰρ εἶναι τὸ πρᾶγμα ἢ μὴ ἀληθὴς ὁ λόγος ἢ ψευδὴς λέγεται). This dictum is thus particularized, in *Met.*, IV, 7, with reference to the various possible cases: 'Affirming non-existence of the existent, or existence of the non-existent, is falsehood; but affirming existence of the existent, and non-existence of the non-existent, is truth.'"

The Stoics have devoted themselves to explaining the method by which truth becomes known, or, as we would now say, they lay much stress on epistemology or the theory of cognition, better expressed by the Saxon formation "kenlore." According to them all knowledge arises from sense perception, and the fundamental criterion of truth is found in the distinctness with which sense perceptions are represented in the mind.

Epicurus, though very different from the Stoics in his ethics, agrees closely with their theory of cognition. His

criteria of truth are sensation and feeling. To him all sensations are true and indisputable.

Here Epicurus ought to have said that sensations are the ultimate data from which we derive our knowledge, but a sensation cannot properly be called true. It is simply a fact.

That Epicurus confused truth and reality appears from his contention that no perception can be proved false (he means unreal) and that even dreams and the hallucinations of the insane are true, because they produce an impression which the non-existent could not do.

The images of past sensations are remembered, and Epicurus calls them representations. Beliefs are called true or false in so far as they are confirmed or refuted by sensations. It is noteworthy that Epicurus disregarded the value of logical syllogism because according to his view no syllogism could supply the place of direct sensation. It is interesting to note that this view is paralleled in India by the materialist school, the Charvakas or Lokayatas, who also deny that logical argument can carry conviction because they claim that the only source of information is sense-perception.

CHRISTIANITY AND THE DOCTRINE OF TWO TRUTHS.

Augustine understands by truth the norm according to which reason argues, and he declares that it must be unchangeable (*De lib. arb.*, II, 3). To reach the unchangeable is to him the attainment of truth. He says (*De vera rel.*, 72 f):

> "If thou findest thy nature to be changeable, rise above thyself to the eternal source of the light of reason. Even if thou only knowest that thou doubtest, thou knowest what is true; but nothing is true unless truth exists. Hence it is impossible to doubt the existence of the truth itself."

Truth and existence are the same according to St.

Augustine, and he identifies them with God (*De vera rel.*, 57; *De trin.*, VIII, 3). This ultimate truth is the highest good in virtue of which all other blessings are good (*De trin.*, VIII, 4). Created things stand in a contrast to the unchangeable highest good and thus indirectly the mutability of created things reminds us of the immutability of truth.

Thomas Aquinas defines truth as *adaequatio intellectus et rei*, which is best translated as "agreement of thought and thing."

During the Middle Ages the church claimed the authority of a special divine revelation as the source of truth, its truth, the truth of ecclesiastical dogmas.

In Spain where in a Mohammedan country a high civilization had developed we find a distinction made between esoteric and exoteric truth. Revealed religion was the truth made palatable to the masses, it was exoteric, while esoteric truth was the special privilege of the thinker, and it was not deemed necessary for the two to agree. In a similar way and not without the influence of Averroës and Maimonides the conflict between scientific truth and religious truth led to the theory of the two truths, theological and philosophical, and it was assumed that what is true in theology need not be true in philosophy and *vice versa*. Prof. M. Maywald has made a special study of this strange aberration in his book *Die Lehre von der zweifachen Wahrheit*, Berlin, 1871, and Windelband condenses this subject in his *History of Philosophy* (pp. 320-321) as follows:

"If, by theology, we understand the exposition of the positive doctrine of religion, arranged and defended according to the formal laws of science, i. e., Aristotelian logic,—and this was the form which the relation of theology to religion had taken in the West as in the East,—it follows that something may be true theologically which is not true philosophically, and *vice versa*. Thus is explained

that doctrine of the twofold truth, theological and philosophical, which went through the entire Middle Ages, although we cannot exactly fix the authorship of this formula. It is the adequate expression of the mental state necessarily brought about by the opposition of the two authorities under which the Middle Ages stood, viz., Hellenistic science and religious tradition; and while at a later time it often served to protect scientific theories from the persecution of the church, it was for the most part, even in these cases, the honest expression of the inner discord in which just the most important minds of the age found themselves.

"The science of the Christian peoples accepted this antithesis, and while the doctrine of the twofold truth was expressly proclaimed by bold dialecticians such as Simon of Tournay, or John of Brescia, and was all the more rigidly condemned by the power of the church, the leading minds could not evade the fact that philosophy, as it had been developed under the influence of Aristotle and the Arabians, was, and must remain, in its inner nature, alien to precisely those doctrines of the Christian religion which were specific and distinctive."

The doctrine of the twofold truth found its most energetic champion in the French savant Pierre Bayle. Albertus Magnus had distinguished between natural and revealed religion, but he clung to the idea that there might be no contradiction between the two. He tried to show that what science and philosophy teach holds good also in theology, but that certain realms inaccessible to natural insight (*lumen naturale*) could be entered only through the mysteries of revelation. Pierre Bayle, however, went so far as to declare that all doctrines of the church were positively contrary to reason, indeed that they were absurd from the standpoint of science. He thus exemplified the sentence *credo quia absurdum*. But the doctrine of the double truth proved a two-edged sword and in the long

served more to weaken than to establish confidence in

ditional religious belief.

rch itself with its usual instinctive foresight

the doctrines of the twofold truth, and the

Lateran Council of 1512 condemned this distinction and pronounced everything false which stood in contradiction to revelation.

MODERN THINKERS.

Spinoza inserts his definition of truth among the axioms, in the sixth of which he states that "the true representation must agree with the object represented."

Hume is a skeptic and so has little to say about truth except that all positive attempts at stating truth are futile.

Kant, who was awakened from his dogmatic slumber by Hume's skepticism, so changed his attitude toward the data of knowledge that instead of a conception of truth he presents in his *Critique of Pure Reason* an inventory of our faculty of working out sense experience into scientific knowledge. He calls his system "critical idealism" and says that since things-in-themselves are unknowable, human knowledge is limited to phenomena. Thus it happens that reason is practically our norm of knowledge; but it may not be accidental that he has nowhere discussed the problem of truth. It is as if this problem had lost its usual significance in his philosophy, and so we find that the very caption of truth is not listed in Gustav Wegener's *Kant-Lexikon*.

Schopenhauer adopts Kant's idealism, but he repeatedly discusses the nature of truth and insists most emphatically on its consistency, saying that truth alone agrees throughout with itself and with nature while all wrong views clash internally with themselves and externally with experience. In fact experience protests step by step against errors.[9] One truth can never upset another, but all must ultimately agree because no contradiction is possible in intuition (*Anschauung*) which is their common foundation. Thus no

[9] Cf. *Grundprobe der Ethik*, 258, and *Welt als Wille und Vorstellung*, II, 114.

truth can be in fear of another. Fraud and error, however, must stand in awe of every truth. All truths form one system. They postulate and complement one another while error collides everywhere.[10] Schopenhauer distinguishes between general truths and special truths, and of these he rates general truths the higher, as gold is more valuable than silver. Gold can always be easily changed into small coin.[11]

Schopenhauer distinguishes between correct, true, real and evident, saying that concepts are correct, judgments are true, material things are real, and interrelations such as mathematical figures are evident. When he speaks of the foundation of truth as being based on intuition (*Anschauung*) he means such knowledge as is contained in geometrical and arithmetical theorems, which in Kant's terminology is called *a priori* and according to Schopenhauer is based on *Anschauung* or intuition whose truth appears or becomes evident by merely contemplating the interrelations of geometrical figures.

There are four kinds of truth according to Schopenhauer. One is purely formal or logical, referring to syllogisms and correctness of deductions; the second is empirical, referring to statements of fact; the third is transcendental where the word is used in the sense of Kant's terminology. It comprises judgments of pure mathematical and pure natural science (referring mainly to the law of causation). The fourth kind of truth is metalogical, referring to the conditions of thinking itself.

Schopenhauer's philosophy, as is well known, insists on the dominance of the will. The intellect, though really the priestess of truth, is misused by the will as his handmaid, for the will in Schopenhauer's system plays the part of the devil. But some of his successors, especially Nietz-

[10] *Panerga und Paralipomena*, II, 253, and I, 136.

[11] *P. u. P.*, II, 22.

sche, accept upon the whole the foundation of Schopenhauer's world-conception, but they deify the will and claim that the intellect ought to be secondary. Nietzsche goes so far as to deny the right of truth to exist except by the gracious permission of the will, and this same tendency to give preeminence to the will has invaded other circles, as we have seen, and has found definite expression in pragmatism. The great question remains whether or not truth is possible at all, and with this question ethics stands and falls as well as science, for if there is no standard of truth neither can there be a standard of right and wrong.

The average opinion as to the nature and function of truth among modern scientists is characterized by John Theodore Merz, who speaks as follows in his *History of European Thought in the Nineteenth Century*:[12]

"At one time—and that not very long ago—the word truth seemed to indicate to the seeker not only the right method and road for attaining knowledge, but also the end, the crown of knowledge. 'Truth, and nothing but truth,' seems still to the popular mind the right maxim for seeking knowledge—the whole truth stands before it as the unity of all knowledge, were it found. I think it is now sufficiently clear to the scientific inquirer, as well as to the philosopher, that love of truth, while it does indeed denote the moral attitude of the inquiring mind, is insufficient to define either the path or the end of knowledge. 'What is truth?' is still the unsolved question. The criteria of truth are still unsettled. It would, indeed, be a sorrowful experience, a calamity of unparalleled magnitude, if ever the moral ideas of truth and faith should disappear out of the soul of either the active worker or the inquiring thinker; but it is with these as with other treasures of our moral nature, such as goodness and holiness, beauty and poetry—our knowledge of them does not begin, nor does it increase, by definition; and though in the unthinking years of our childhood we acquire and appropriate these moral possessions through the words of our mother-tongue, they rarely gain in depth or meaning by logical distinctions which we may learn, or to which we have to submit, in later life. These do

[12] English translation, p. 29 f.

not touch the essence, though very frequently they may succeed in destroying the depth, of our convictions.

"In the place, then, of the high-sounding but indefinable search after truth, modern science has put an elaborate method of inquiry: this method has to be learned by patient practice, and not by listening to a description of it. It is laid down in the works of those modern heroes of science, from Galileo and Newton onward, who have practised it successfully, and from whose writings philosophers from Bacon to Comte and Mill have—not without misunderstanding and error—tried to extract the *rationale*."

While knowing that this is the average opinion of our scientists we must enter a vigorous protest against the proposition that "the criteria of truth are still unsettled." It is true enough that "the scientific method has to be learned by patient practice, not by listening to a description of it," but that what has been successfully practised by the heroes of science from Galileo down to Lord Kelvin, Hertz and their most recent successors, should be equivocal and doubtful is not true. The methods of an investigation of truth are not vague nor indefinite. Our scientists rely on observations unequivocal and reliable, which are made by mechanical contrivances, registry machines, instruments of precision, with photography and chemical reactions, according to circumstances. We always have a combination of sense perception, which at present is rendered more reliable by the invention of various devices, the machinery of the scientist, with the calculation of arithmetic, mathematical construction or logical argumentation. In brief, the scientific method is, as cognition has always been since the beginning of the human race, sense experience treated by the rules of reason (the purely formal sciences). Sense experience furnishes the fact in question, reason (that is, the sum total of all purely formal modes of reasoning) furnishes the method of treating the facts, of classifying and systematizing them.

TRUTH AND MIND.

There is an unmistakable agreement among most of these different opinions as to the nature of truth. It seems that all philosophers of the world bear in mind a certain ideal and are guided by the same tendency only with more or less lucidity and with more or less depth. It is plain that truth is a relation, and it always denotes an agreement between thought as stated in a formula and the object of thought, whatever the latter may be. If this object of thought be called "thing" we can accept unhesitatingly the definition of Thomas Aquinas that truth is the agreement between thought and thing (*adaequatio intellectus et rei*); in fact this is the simplest definition, but it needs further explanation as to the nature of both thought and thing.

Truth is in thought and in thought only. There is no truth elsewhere. What is sometimes called truth ought to be called reality or existence, actuality, fact or whatever else we may call the objective meaning of a thought. There is a great difference between existence and truth. Facts (by which we mean concrete things, events or conditions that obtain independent of what anyone may think of them) are real, while truths are correct images, symbols, descriptions, or representations of such facts. The sense impressions of which a sentient being becomes conscious are not truths but facts. They are the data from which we construct our knowledge of the objective world. These sense impressions are the results of impacts made by the surrounding world upon a sentient being . Sense impressions are states of awareness which come to indicate the presence of the causes producing them, and thus these sense impressions acquire meaning, or, as we might say, are worked out into sense perceptions. The external impacts are physical facts—ether waves that strike the eye, air

waves that strike the ear, mechanical impressions that affect the skin, etc. Sense impressions are psychical, they are states of feelings, and sense perceptions are mental.

As soon as a sense perception begins to stand for its external cause and is interpreted to picture, delineate or characterize an outside fact, we have to deal with mind, and mind is the domain of truth. While a sense impression is a fact, a sense perception may be true or false.

Sense impressions work with the infallibility of natural laws, and they are nature's work over which we have no control; but sense perceptions are our own doing. They are the result of a reaction which takes place in us in response to a number of sense impressions. Every sense perception, even in its simplest form, is an unconscious judgment. It presupposes that a sense impression of the same kind has been received and has left a trace in the sentient substance. If then a new sense impression of the same kind is made, it fits into the path left by the trace of the former sense impression and revives it. Thus we have two feelings, that of the new sense impression and the revived memory of the former sense impression, but in addition there originates another and a new feeling by the fusion of the two which is the perception of the two being of the same kind. The analogy to a logical syllogism is obvious. The memory of the preceding impression represents the major premise, under which the new sense impression is subsumed as the minor premise, and the feeling that the impression fits is tantamount to the conclusion that the subjects of the premises belong to the same category.

So far as prior and subsequent sense impressions tally correctly, they are appropriately called true, and the truth consists in the correct subsumption of what belongs in the same class. Thus truth in its simplest shape is the fitting of a certain form of feeling in its proper place, or by impli-

cation the correctness of the unconscious judgment that the new sense impression is the same in kind as the preceding one and indicates the presence of the same cause.

Truth and mind are twins, and truth is co-existent with mind. When sense impressions acquire meaning, when they develop into perceptions, mind originates and the origin of mind denotes the birth of truth, and also of the possibility of error.

SENSE PERCEPTIONS AND HALLUCINATIONS.

The formation of sense perceptions is the beginning of mind, but by the side of sense perceptions there are hallucinations. Does not their mere existence obviously invalidate the character of sense perceptions, especially their reliability, and does it not thereby throw suspicion upon truth?

We grant the occurrence of hallucinations, but their prevalence no more invalidates the reliability of sense perceptions than the prevalence of error invalidates or renders doubtful the character of truth. We must only bear in mind that with the appearance of truth there necessarily rises the possibility of error, and this happens at the very beginning of the origin of mind. In other words, as soon as sense impressions change into sense-perceptions there appears the possibility of mistakes. If a sense impression receives a wrong interpretation it is called an hallucination. Here is an instance.

The eye of a sentient being gazes fixedly at a red figure on a white sheet of paper and this red spot on the retina is rightly conceived and interpreted by the resulting sense perception. Now the paper is withdrawn, but the image persists, except that in place of the red figure a blue spot of the same outline appears in view, and this seems almost as tangible and real as was the red figure. We call it the after-image of the red figure, and its nature is suffi-

ciently explained in the physiology of optics. This after-image is as truly a sensation and it is as real as is the original sense impression, and if we interpret it rightly to be an after-image we cannot speak of it as an hallucination. But suppose the eye were part of the organism of an unsophisticated person who knows nothing about sense illusions, the after-image would naturally be interpreted to indicate the presence of a blue figure, and this wrong interpretation would be called an hallucination.

Hallucinations accordingly are sensations produced by internal causes which are wrongly interpreted to be of external origin. There may be hallucinations of all the senses —even tactual and gustatory, but the auditory hallucinations caused by some internal disturbance of the ear and also of the center of hearing are the most common. Next to them in frequency are visions which are the hallucinations of the sense of sight, frequently caused by disturbances in the eye, specks in the circulating fluids of the outer eye or on the retina, but they are sometimes also caused by an abnormal excitation of the cerebral center of vision.

The sensory part of hallucinations is an actual fact and is as real as any sense impression; the fault of hallucinations lies in the wrong interpretation which is superadded by the mind. Therefore, it has been rightly remarked, it is wrong to speak of sense illusions, for in these so-called sense illusions the senses remain reliable, and it is the mind which errs. Sense illusions are instances of such circumstances as are apt to mislead our judgment, but they are really mental mistakes. They are in the domain of sense perception what in the realm of our intellectual activity is called error,—a failure to attain the truth.

The field of hallucinations is wide but we need not enter into further details. We will only say that dreams are natural occurrences, and we may call them hallucinations experienced in sleep or in any subconscious state in which

the normal waking consciousness is temporarily obliterated. The sensory experience of dreams is as real or at least may be as real as the sense impressions of a normal life, and a scientifically educated man knows them to be dreams. But if a nervous patient or the untrained Indian assumes dreams to be realities, he falls into an error, and then his dreams—especially if they occur in a half awake state of mind which sometimes may happen—become hallucinations.

UNIVERSALS AND THEIR CORRELATES.

Thus we see that the foundations of truth are laid by nature herself in accordance with natural law and with the same precision as that which originates in a machine by mechanical necessity. This mechanical necessity is possible only on the supposition that the world is law-ordained, that the beams of light are such and always such, that the same causes under the same conditions always produce the same results, and that this world is a world of uniformities, not a sporadic chaos. If the world were a sporadic chaos, mind could not have originated even in its most primitive beginning. In fact mind is nothing but the systematic upbuilding of the lawdom (*Gesetzmässigkeit*) that prevails in the world, and we may say that this lawdom is the ultimate basis of truth; it is the condition which makes truth possible.

Facts appear to be chaotic. Not one is exactly like any other. All the various facts that appear in existence present a kaleidoscopic irregularity which in itself appears to be a hopelessly confused tangle. If mind did not originate, the world would remain a meaningless play of blind forces. But the very origin of mind proves that law rules in the world of facts, and all these innumerable items of material existence and this display of unlimited forces is

subject to rule, which makes it possible to formulate all occurrences into general formulas.

There has been much discussion in the history of philosophy about universals, and two contradictory views have been taken of this much mooted subject. There are on the one side thinkers who see in universals the only true reality, the true being or ὄντως ὄν, and on the other side observers of nature who look upon them as mere generalizations which have no true existence and have been invented merely for the purpose of classifying the real things. Both views are right, but both are one-sided, and much depends upon the meaning of the word "real." If it means "thingish," as the word implies, universals are nonentities, for they are not things, nor objects, nor concrete material bodies, they cannot be touched by hands or perceived by any one of the senses.

If concrete actuality of existence is the meaning of "real" we must absolutely grant that universals do not possess reality. From this standpoint the nominalists speak of universals as *flatus vocis,* as words, and more modern followers of this line of thought treat them as devices for thinking the realities of life. Materially considered universals are non-existent. They are products of the scientist's imagination and neither telescopes nor microscopes, no chemist's crucible nor physicist's scales will ever discover the slightest trace of the actual existence of universals, natural laws, formulas, Platonic Ideas, or anything that belongs to that class.

Now let us consider the opposite view. Does the nominalist school or any one of their type really mean to say that universals are mere *flatus vocis,* mere generalizations, mere contrivances to think the world more easily? Many men of this type actually say so, but do they truly mean it? Would they really be prepared to say that universals possess no objective meaning, that there is nothing corre-

sponding to them in the actual world? We have granted that no actual things, no material entities correspond to them. They are not divinities presiding over certain departments of nature as represented in the mythology of the religions of the past, nor are they metaphysical essences which somehow mysteriously underlie the phenomena of nature. Nevertheless there is no one who would be prepared to deny that there are certain somethings corresponding to them in the actual world, and that these somethings are the very factors which shape the world. These somethings are not of a material nature, nor are they energies; they are of a purely formal nature, they are relations, shapes, arrangements of parts in one way or another. Yet these purely formal arrangements are the essential conditions of the world of material actuality which determine new formations, and so we cannot say that in every respect they are nonentities.

It is obvious that reality or thingishness and actuality, which means that the material things act, that they do something, that they move about, that there is an active play of forces summarized under the term of energy, are not the whole of existence. There is some additional feature which is non-material and has nothing to do with energy. It is the shape, the interrelation, the form, the direction, the arrangement in which either forces or material particles are combined, and this interrelational something is the true factor that moulds the world and is the reason why this enormous congeries of atoms is not a chaos but a law-ordained cosmos.

We must not overlook the fact that in addition to form there is another non-material element ensouling the world, and this is that indescribable something which develops into human consciousness. It is feeling, the peculiar characteristic of which appears in awareness. For reasons into which we need not enter here, we assume that the

whole world is aglow with a potentiality of feeling, which in a philosophical term we may call subjectivity. Subjectivity emerges from purely physical conditions and finally develops in the course of a long evolution into the thinking subject. But even this psychic element of subjectivity would have remained forever a scintillating chaos of subconscious feelings if its elements had not been arranged into an orderly whole according to the laws of pure form. It is the orderly interrelation of elementary subjectivity which in a nervous system makes feeling possible; it is further the proper classification of feelings of the same form which renders feelings representative; and finally it produces reason in the natural course of the evolution of mentality.

The significance of interrelations, of the mode or arrangement, of form, has been strangely overlooked in philosophy, while it has produced in minds of a mystic turn fantastic views as to the nature of spirit, soul and God. Opponents of mysticism have always been inclined to deny the existence of anything spiritual. They try to do without believing in spirit, soul, or God, and certainly they are right in denying the mythology attached to these notions. Nevertheless the facts remain, and the facts which produce these notions are explicable by the significance of relations and forms, and though the purely formal laws as laws have no objective existence, there are purely formal relations which are of utmost importance, and though they are not real in the literal sense of reality, though they are not thingish, they are not for that reason negligible quantities, for they are the most essential feature of all existence. In fact all comprehension, all cognition, all intellectual activity becomes possible only through them. When we speak of reality and actuality, we refer merely to statements of fact. These names—reality and actuality, in other words, matter and energy—contain nothing that can be

understood or would become in any way an object of comprehension. All comprehension consists in tracing transformations of matter or the changes of the forms of energy. Matter and energy simply represent the "that" of existence, not the why or the wherefore.

Accordingly we come to the conclusion that there are objective correlates of our subjective thoughts, of universals, of the laws of nature, and also of the unities of parts which combine into things. Though they are neither concrete objects nor metaphysical essences, they possess an objective significance. They are traceable in the uniformities of nature and the laws in which we summarize these uniformities are true and reliable descriptions of definite features of the constitution of the world. We call these descriptions, these laws of nature, these generalized statements of fact, truths, and the instinctive reverence which men at large have for these truths is well grounded.

THE ONENESS OF ALL TRUTHS.

Experience has taught us to look upon all truths as one great system of more or less general uniformities, which are co-, sub- and super-ordinated in such a way that all of them complement one another and that the more general truths comprise and thereby explain the more particular ones; while the latter are specifications of the former. At any rate we expect that no two truths shall contradict one another. They form contrasts but never come in conflict with each other. The more they stand in contrast the more they are supplementary. This leads to the assumption of the unison, the harmoniousness, the consistency, of all truths. To state the case from the opposite point of view, we assume *a priori* that there cannot be any contradiction in truth, and so we try to harmonize all contrasts that might occur in the field of our observation.

The *a priori* assumption of the unity of all truth which

finally abuts in the theory of the oneness and consistency of all existence, called monism, is as a principle of thinking ultimately based in the systematic unity of our mind. The human mind has been built up during the course of its development as a collection of uniformities and these uniformities have classified themselves in proper order according to their sameness, similarity and kinship, so that the whole constitutes a system, and this system represents the prototype of logic. The rules of logic have been deduced from it, and in this sense the human mind is predestined to produce in its further development certain ideas which such philosophers as Leibnitz call "innate."

The human mind has reached that point of mental development in which a sentient being can designate by name the several co-, sub- and superordinated classes and become conscious of their interrelation. The animal mind cannot do so and yet it acts instinctively as if it were possessed of logic. The reason is that its composite memory images are logically arranged and operate like a living machine in a perfectly logical order. Through the instrumentality of language this interrelation can be objectified in terms of abstract thought and presented in systematic form. This system of interrelations becomes a conscious faculty of thought, called reason, which is used as a method for an orderly arrangement of ideas. In its highest perfection the application of this method is called science.

Reason enables man to see in every single occurrence an instance of a general rule, and if general rules describe real uniformities, if they possess correlates in the objective world, we call them truths.

We understand now that the domain of truth and the realm of the mind are coextensive, and mind is practically nothing but the embodiment of the most common truths of the world order, the logic of which in its systematized form we call reason.

We will here forestall a common error frequently committed by beginners and would-be philosophers, which is this, that the most general truths ought to contain the key to all the riddles of the world. In a certain sense this is true enough because an important part of explanation consists in subsuming a certain set of experiences under its proper caption, but all explanations presuppose also a knowledge of the reason why in specific cases a general rule will produce specific results. The power of generalization is the first development of mentality, the power of discrimination is its more subtle and also more difficult correlate. Those who praise a man for his power of generalization, forget that the savage, as well as the superficial investigator, is great in generalizing all things, but that he is weak in making the necessary discriminations. In fact, wrong generalizations are a common source of many errors, and no scientist can attain distinction unless he is keen in discrimination.

Truths are discovered, they are not invented. Though truths belong to the mind and exist only in the mind in the thinking subject, they have an objective significance and describe conditions which obtain somewhere or somehow independent of the mind.

When we say truths are discovered we mean that they cannot be different, and it is not in our power to shape them as we please. They are predetermined and this again implies that in some form or other they exist as potentialities. At the same time the truths which are formulas representing laws of nature are potent factors of reality, and these prototypes of our truths we will call verities. While the verities in their totality as the sum total of the determinants of the world order correspond to God the Creator or God the Father in the Christian doctrine of the Trinity, a perfect system of all the truths would correspond to God the Son, truths being incarnations of the verities. In addition

to the contrast between verities and truths, there is a middle ground composed of those ideas which tend to set the world in harmony with the cosmic order and these are called ideals. These ideals in so far as they pursue the right tendency represent the third person of the Trinity, the Holy Ghost.

Truths are subjective statements, but the reason why they are truths and deserve this high name is their agreement with their objective correlates, and it is noteworthy that these objective correlates are not concrete things but features of things, relations, proportions of interdependence, and other items or events determined by definite causes such as can be subsumed under general formulas. These objective correlates of truth are not concrete things, nor divinities, nor metaphysical essences; the formulas are mere generalizations, and what corresponds to them are generalities of existence which however are not nonentities. They are not material, not concrete, they are interrelations and thus belong to the domain of pure forms. A comprehension of them transforms sentient creatures from the state of brute animals into rational beings, and the objective counterparts, though mere interrelations of the material universe constitute the factors which determine its development and mould the inert mass of material existence into that grand law-ordained cosmos as which we comprehend the universe.

We call the formulas which correctly describe the uniformities that obtain in the universe, truths, and the same term is sometimes also applied to their objective correlates; but in order to distinguish the two we propose to call the latter "verities."

Pragmatism denies the existence of verities. It does not believe in consistency and repudiates the unity of truth. It knows only truths in the plural and these truths have

no objective significance; they are shifting and without stability.

The better we know the uniformities of nature, of social interrelations and of all the phases of life, the more profoundly conversant do we become with the constitution of the universe, or in other words, the more we know of truth the farther does our soul extend and the deeper does it fathom the world. Truths are the subjective reflection of the verities that sustain the universe. The more we know of truth, the higher shall we rise in the course of evolution, the better adapted shall we be to the conditions of life, the more powerful shall we become, the higher shall be our dignity and our worth, and the nearer shall we be unto God,—for what is God but that systematic unison of all the correlates of truth? God is the oneness of all the verities of existence.

In the same way as uniformities are not mere subjective notions, not mere names, but designate definite conditions in the objective world, the things which we meet with in experience are not mere conglomerations of parts. True things, by which we here mean objects of experience which are rightly conceived as unities are not arbitrarily so named and are not of a purely subjective nature. The unity of the thing in our conception corresponds to a unity of its parts in the objective world. It is true that what we call things are bundles of sensations, and we can analyze things into their constituent parts, but the bond of union is of deep significance. An engine is not the sum total of its parts, but the arrangement of its parts in such an interrelation that it will do work, and so we must grant that combinations, groupings, forms, interrelations produce definite and actual effects.

And what is the test that an aggregate of parts constitutes a true unity, a thing worthy of the name? A true thing must not be a mere addition of its parts, not a mere

summation of its elements, not a mechanical mixture of its ingredients, but a combination into a systematic whole which possesses an individuality of its own; and the test is that a thing which is not a mere quantitative aggregate but constitutes a higher configuration into something new is qualitatively different from its parts.

To look upon formations, the relational factors, or the purely formal aspect of things as nonentities, because they are not material items is a misconception of the paramount significance of form. We not only grant, we even insist most emphatically that there are no "things-in-themselves," no unknown or unknowable metaphysical magnitudes behind the world of experience, but for all that we recognize the objective significance of things, the efficiency of formations, of natural laws, of uniformities, and also the importance of the idea of unity, the highest realizations of which are found in organisms, plants, animals and above all in human personalities.

CONCLUSION.

Truth has been on trial. The very backbone of truth, its consistency, the unison of all truths, has been doubted and even denied. The belief in the stability of truth, in its persistence and eternality has been denounced as a superstition.

So far truth has guided us safely from the beginning of mentality; it has endowed man with reason, it has created the sciences, inspired the inventor's imagination and is still leading mankind onward on the path of progress, but it has grown old-fashioned, and the new generation has become tired of it. The old truth is the living water which nourishes, sustains and quickens every fiber of our mental constitution, but this generation is thirsty for innovations. They are sick of the monotony of a truth that is true to itself; they hanker for a truth that is variegated,

fickle, multi-significant. So they leave this venerable ideal and look upon it as an idol. It no longer fits into the program of the "new thought" movement, and pragmatism replaces it by a more elastic kind of truth which can change with the fashions and makes it possible that we need no longer trouble about inconsistencies; for what is true to one need no longer be true to others, and the truth of to-day may be the real now, and yet it may become the error of to-morrow. The new conception of truth flatly contradicts the old rigorous and inconvenient notion according to which no two truths can be contradictory. The pluralistic truth is more accommodating, for it lets all contradictions pass and dispenses with the exacting demands of the old ideal of consistency.

This new truth conception is a fad that has its day but will pass by, for truth, the old time-worn and time-honored ideal of truth as being one and eternal, will sooner or later assert itself again. We cannot live without truth, and the new truth is a pseudo-truth that cannot help us. Those who resent truth's sternness and stability prefer to conceive truth as an errant light which points in one direction to-day and in another to-morrow. This truth is a will-o'-the-wisp which does not throw light on the path of progress but entices its followers to wend their way into the quagmire of opinions and opinionated subjectivism.

In the meantime the truth continues to encompass us, for truly all our mental life lives by the grace of truth, and in it every creature that thinks, lives and moves and has its being.

Truth, most wonderful presence in the life of man, thou encompassest our every throb of thought. Thou art God incarnate in our soul. Without thee spirituality would never have risen into being, the light of cognition would not shine, and chaotic darkness would prevail. Without

thee this world would be a congeries of dull matter and a play of blind forces void of meaning and void of purpose.

How ineffably great art thou, O Truth, and yet thou hidest thyself in things small. The senses can not find thee, for thou art not made of matter, nor dost thou consist of force. Thou residest in the meaning of fleeting sensations, and thy significance is a mere relation, a description of the uniformities of nature. And yet thou alone possessest dignity, thou alone art worthy to be called divine, and thou art the son of that All-One whom thou revealest, that One in All who sways motes and stars and moulds the destinies of all the worlds.

Thou needest no shrines and no altars and thou demandest no doxologies. There is no worship that pleaseth thee, except the worship without ritual, a surrender of error, of falsehood, of lies. He is thy true devotee who receives thee in his soul and invites thy presence to bless him.

The ideal of truth may remain neglected or misunderstood for some time, but its light will not be darkened forever. We need not fear for truth, because truth will take care of itself. The cause of truth is God's cause, for truth reflects and reveals the eternal, and the eternal is God.

EDITOR.

THE SILENCE OF JOSEPHUS AND TACITUS.

IN the fierce attacks upon *Der vorchristliche Jesus*[1] precipitated by the adoption, accentuation, and popularization of its theses in the epoch-marking writings and lectures of Prof. Arthur Drews, conservative theologians have very properly declined to take part, thereby combining (as Bacon would say) serpentine wisdom with columbine innocence. They have clearly perceived that the movement was not directed against their position, but against the citadel of their century-old foe, who would reduce their Divinity to the ranks of men, and at least one of the very greatest of them (in a letter to the present writer) rejoiced sincerely at beholding the sudden fall of that adversary. No! It is the liberal critic, so long enthroned in the seats of learning, who has been amazed to see his central concept of the purely human Jesus put on trial for its life and more than half-convicted, and who, *ingemiscens tamquam reus,* has now for nearly a twelve-month plied an unavailing pen in passionate protest against the audacity of this "assault upon the liberal theology."

In the sallies of the besieged much weight has been laid upon profane testimonies, particularly of Josephus and Tacitus. It is Chwolson in St. Petersburg that has bared his arm of might over the Josephine section;[2] it is Von Soden in Berlin that has stressed so strongly the

[1] Giessen, Alfred Töpelmann, 1906.

[2] *Ueber die Frage ob Jesus gelebt hat.*

Tacitean chapter.[3] However much we may reverence these scholars in their cooler moments, it is not easy to take these impassioned utterances seriously. They do not indeed take each other seriously. The very section that Chwolson so eagerly defends, Von Soden declares (p. 11) to be "undoubtedly interpolation" by Christian hands. Involuntarily one recalls the famous appeal "from Philip drunk to Philip sober," and wonders how these "higher critics" (who are much higher than deep) will write tomorrow. To track down the endless inaccuracies and fallacies of their hasty superficialities would be a weary and bootless task, like chasing field-mice in autumn: stamp them out here, and lo they stir the soil yonder. In this case to be just would be cruel; we can afford to be generous and to pass over these *Flugschriften* as too flighty for detailed notice.

However, the passages in question do really call for a calm and careful and thoroughgoing treatment, such certainly as they have not yet received in this furious Battle of the Booklets, and to such an examination we now invite the patient attention of the reader.

When the liberal critic is called on to justify his dogma of the mere humanity of the Jesus, his only recourse must be to some form of historical record. A merely human life is a matter merely of human history, to which accordingly appeal must be made. The history is either sacred or profane. The testimony of the former is not here in debate and besides has been examined closely elsewhere by the present writer. Of profane history the witness is "brief, but endless" if indeed there be any such witness at all. The first and by all odds the most important is found in the *Antiquities* of the Jewish historian Josephus, precisely the work in which one would search for it with the liveliest interest and the greatest confidence. The attestation as

[3] *Hat Jesus gelebt?* and in *Berliner Religionsgespräch*, p. 39.

we read it now is clear, decisive, and unequivocal. Accepted at its face value it settles forever the question that now so agitates the head and heart of Germany. It deserves then the most conscientious and open-minded scrutiny.

Such a scrutiny discloses in the first place that the chapter in which the deposition is found is *concerned exclusively with calamities that overtook the Jews.* It is sandwiched between two other sections that tell of bloody disasters that befell God's people at Rome and Jerusalem. Now unless this passage itself tells of some sanguinary misfortune to his countrymen—and in spite of Chwolson it is hopelessly absurd and ridiculous to attempt any such construction—it seems impossible that Josephus should have introduced it in this connection. We make this preliminary observation in hope that the reader will bear it constantly in mind from the very start, and because it is of itself absolutely decisive against the whole section and against every emendation thereof that apologetic ingenuity can suggest. There is not one word of the entire passage that can stand against this single consideration, namely, that all the rest of the chapter, both before and after, is devoted to the afflictions that scourged the countrymen of the historian.

Here then is this famous section reproduced in its (condensed) context:

Archeology, Book XVIII, chap. III.

§ 1. Pilate, procurator of Judea, removes the army from Cæsarea to Jerusalem for winter quarters and against all precedent brings Cæsar's effigies by night into the Holy City. The Jews flock to Cæsarea protesting for five days, but in vain: the sixth day Pilate forms a plan to massacre them, but struck with their heroic devotion in laying down their bared necks he relents and orders back the images from Jerusalem to Cæsarea.

§ 2. Pilate undertakes to supply Jerusalem with water,

using sacred money. The Jews protest clamorously and abusively. So he distributes among the populace soldiers in citizens' dress; at a signal (when the Jews refused to disperse) the soldiers draw their concealed daggers and slaughter: "And they bore themselves no way mildly, so that the people, being caught unarmed by the soldiers attacking fully prepared, many of them perished thus and some ran away wounded. And so the sedition was stopped.

3. "And there appeared at this time Jesus, a wise man, if man indeed it be lawful to call him. For he was a doer of marvelous works, (a) teacher of men that receive the truth with pleasure. And many Jews and many too of the Hellenic (race) he brought over to himself. This was the Christ. And when on the evidence of the first men among us Pilate had condemned him to the cross, they did not cease who had loved him at first, for he appeared to them on the third day again alive, the divine prophets having spoken both these and myriad other wondrous things about him. And (even) until now the tribe of the Christians, named from him, is not extinct."

4. "And about the same time another terrible misfortune[4] confounded the Jews"....Then follows the story of the deflowering of Paulina in the temple of Isis by Mundus personating Anubis, and of the punishment of this sacrilege by Tiberius, who demolished the temple and crucified the offenders all but the principal, Mundus himself.

5. The misfortune of the Jews: 4000 are banished from Rome for the wickedness of four, a Rabbi and three confederates, who procured gifts from Fulvia, wife of Saturninus, under false pretences.

We can hardly covet the critical insight that sees in this § 3 the hand of Josephus. *The chapter deals solely with the misfortunes of the Jews at Caesarea, at Jerusalem,*

[4] ἕτερόν τι δεινόν.

at Rome. The Section 3 is entirely out of relation to its context.

Moreover, that § 4 follows immediately upon § 2 is plain to see in the words "*another calamity.*" The obvious reference is to the preceding massacre in Jerusalem. *There is no possible reference to this* § 3.

Furthermore, the style is not that of the historian. It is plain, straightforward, uninvolved, in contrast with the tangled meshes of the Josephine sentence.

Still more, however, and decisively, *the writer of* § 3 *is a Christian.* He declares positively, "This was the Christ."[5] Posing as Josephus, he says of Jesus "wise man," but instantly corrects himself, "if man indeed it is lawful to call him"; he describes Jesus as a doer of prodigies, as a teacher of the truth; he affirms distinctly the resurrection, "he appeared the third day again alive"; he accepts the whole body of ten thousand wonders told of him as Messiah and foretold of him by the divine prophets. Such faith as this, and such an open avowal, might satisfy even the Holy Office of the Inquisition.

Once again, the phraseology smacks strongly of the New Testament. Thus *γίνεται* in the sense of *comes* (Mark i. 4; John i. 6; 2 Peter ii. 1; 1 John ii. 18) and the change from past to present tense;[6] "that receive the truth with pleasure";[7] compare "the principal men" with "the head men"[8] of the Gospels, Acts, Epistles; also "they that loved him at first" with John xiii. 1, "having loved his own in the world, he loved them to the end"; also the "myriad wonders" with John xxi. 25, "The world could not contain the books that would be written."

Finally the phrase "until now" recalls the New Testa-

[5] ὁ Χριστὸς οὗτος ἦν.

[6] So also παραδόξων, as in Luke v. 26, εἴδαμεν παράδοξα σήμερον.

[7] Cf. Luke viii. 13, "receive the word with joy"; Acts xvii. 11, "received the word with all zeal"; James i. 21, "receive in meekness the engrafted word."

[8] ἄρχοντες.

ment "unto this day" (Matt. xxviii. 15) and indicates similarly a late date for the paragraph, surely later than A. D. 80, when Josephus wrote his Archeology. Schürer observes (§ 17, footnote 24) that "Josephus has certainly been interpolated by a Christian hand"; and in view of all the foregoing there should be no hesitancy in bracketing this section, with the great editor Bekker, as spurious.

To this internal evidence comes the decisive external fact that the section was unknown to Origen. This most learned of the Fathers, in his polemic against Celsus, had frequent and pressing occasion to use every scrap of outlying testimony to the Christian thesis assailed. As we shall immediately see he quotes copiously and repeatedly from Josephus witnessing concerning James the Just; he had every occasion and every motive to quote this incomparably far more relevant and far more important witness concerning the Christ. That he never calls it in evidence, is morally conclusive proof that he did not know of its existence, which can only mean that it was not in Origen's copy of Josephus. No attempt yet made to evade this conclusion seems worthy of any notice. The fact that the passage is not mentioned by still earlier writers, as Irenæus, Tertullian, Clement of Alexandria, and others, affords corroboration if any be needed.

It seems then that the non-Josephine origin of this section is indicated unambiguously by almost every kind of evidence that can be available in such matters. Its testimony would appear to be not for but distinctly against the position it was invented to support; for men do not fabricate documents to corroborate the true but to recommend the false. Let us not insist on this, however, but remain content with the obvious fact, that on the most favorable reckoning possible, the section labors under the gravest suspicion and can attest nothing save that itself is in the direst need of attestation.

Here at the outset it may be well to observe that the general hypothesis of Christian interpolation needs no vindication and involves no improbability. For that it is a fact in countless cases is admitted on all hands. Leaving aside the New Testament for the present, the list of outright pseudonymous Christian compositions, universally so recognized, is long and formidable. It is not necessary to burden these pages with any such list, since such lists are easily accessible and the general fact is nowhere in dispute. Moreover, of works probably genuine, it is the rare exception that has escaped interpolation. Jewish works were regularly adapted to Christian use by this approved process of intercalating Christian sentiments, dogmas, or allusions. Witness the Sibylline Oracles, the Testaments of the Patriarchs, and the Jewish Apocrypha in general. So far then from being antecedently improbable, such interpolation is very probable antecedently, it is more likely than not. Nevertheless, to leave a wider margin of safety, we shall employ this form of argument sparingly, not wherever its use is possible, but only where it is recommended by independent considerations.

A second reference of Josephus to Jesus might be imagined in the following paragraph (*Arch.* XX, 9. 1) treating of the death of James, "the brother of the Lord":

"Ananus, then, being such (as I have said), fancying he had now a fitting opportunity, since Festus was dead and Albinus was still on the road, assembles a Sanhedrin of judges, and having brought thither *the Brother of Jesus, him called Christ* (*James was his name*), *and* some certain *others* and having made accusations (against them as) lawbreakers, he delivered them to be stoned."

The words in italics[9] have been bracketed as spurious, —we think, correctly. Neander and others defend them,

[9] τὸν ἀδελφὸν Ἰησοῦ τοῦ λεγομένου Χριστοῦ (Ἰάκωβος ὄνομα αὐτῷ) and καὶ ἑτέρους.

and McGiffert says (*The Church History of Eus.*, p. 127, n. 39), "It is very difficult to suppose that a Christian in interpolating the passage, would have referred to James as the brother of the *'so-called* Christ.' "[10] Indeed! On the contrary, it is just because this phrase is the most approved Christian, evangelic, and canonic, that we suspect it in Josephus. It meets us in Matt. i. 16; xxvii. 17, 22; John iv. 25. The depreciatory "so" is not in the Greek. Thus we read of "Simon the one called Peter" (Matt. iv. 18; x. 2), "the high-priest the one called Caiaphas" (Matt. xxvi. 3), "the feast the one called Passover" (Luke xxii. 1), "the man, the one called Jesus" (John ix. 11), "Thomas the one called Didymus" (John xi. 16; xx. 24; xxi. 2), "gate the one called Beautiful" (Acts iii. 2), "tent the one called Holy of Holies" (Heb. ix. 3), where depreciation is out of the question. The indication is merely that of a surname or nickname or name in some way peculiar or extraordinary.

It seems incredible that Josephus should throw in such an observation at this stage without any preparation or explanation or occasion. Moreover, it is certain that Josephus has been interpolated elsewhere by Christian hands, and with precisely this same phrase, for Origen thrice quotes as from Josephus the statement that the Jewish sufferings at the hands of Titus were a divine retribution for the slaying of James: "Josephus says in his Archeology, 'According to wrath of God these things came upon them, for the things dared by them against James, the brother of Jesus the one called Christ'....And he says that 'the people too thought they suffered these things on account of James.' " (463) *in Mat.* XIII. 55. "The same [Josephus] seeking the cause of the fall of Jerusalem and of the demolition of the Temple....says, 'These [calamities] befell the Jews in vengeance for James the Just who was

[10] τοῦ λεγομένου Χριστοῦ.

brother of Jesus the one called Christ, since indeed they slew him though being most just.'" *Contra C.* I, 47. "Titus demolished Jerusalem, as Josephus writes, on account of James the Just, the brother of Jesus the one called Christ"—*Contra C.* II, 13 *fin.* The passage is still found in some Josephus manuscripts, but as it is wanting in others it is and must be regarded as a Christian interpolation older than Origen (against Hilgenfeld, *Einleitung*, p. 526, who thinks the passage has been expunged from Christian manuscripts of Josephus!). Now since this phrase is certainly interpolated in the one place, the only reasonable conclusion is that it is interpolated in the other. This notion that the death of James was avenged in the siege of Jerusalem is found in the bud in Hegesippus, who says: "And so he suffered martyrdom. And they buried him on the spot beside the temple.... This man became a true witness both to Jews and to Greeks that Jesus is the Christ. And straightway Vespasian besieges them" (Eus., *H. E.* II. 23, 18).

But does not the phrase itself attest the mere humanity of the Jesus? Now it is plain that if James or any one else was really the flesh-and-blood brother of the Lord or of Jesus, then this latter was assuredly pure-human. But is flesh-and-blood kinship meant by the term "brother"? It is not certain, it is not even probable. Winckler (in *Arabisch-Semitisch-Orientalisch*) and others have shown us how broad is the notion of brother in the East. In the New Testament itself the term is used continually, regularly, to denote religious relation without the remotest hint of blood kinship. In the West and to-day it is similarly used of all members of an organization secular as well as religious. In the Gospels[11] Jesus himself is made to ask, "who are my brothers?" And he answers, "They that do

[11] Matt. xii. 46-50; Mk. iii. 31-35; Luke viii. 21. See also Matt. xxv. 40; xxviii. 10; 1 Cor. ix. 5; Gal. i. 19.

the will of my Father in Heaven." Here then in the most ancient church we find distinct declaration that to be "Brother of Jesus" was to keep the law, to do the will of the Father in Heaven. Now it was precisely this punctilious fulfilment of the law for which this James the Just was famous. This fact is well known and universally admitted, so that it stands in no need of formal proof.

In Acts we hear a good deal of this James, but only in this character as the leader of the law-abiding disciples. No less an authority than Jerome (A. D. 387) has expressed the correct idea on this point. In commenting on Gal. i. 19 he says (in sum): "James was called the Lord's brother on account of his high character, his incomparable faith, and his extraordinary wisdom; the other apostles are also called brothers (John xx. 17) but he pre-eminently so, to whom the Lord at his departure had committed the sons of his mother" (i. e., the members of the church at Jerusalem). Similarly Origen. From 1 Cor. ix. 5 we see with distinctness that there was a class of Messianists, nearly coordinate with the Apostles, bearing the honored name of "Brothers of the Jesus," or "of the Lord"; also a class called "Brothers of Kephas." Hence in Corinth some said, "I am of Kephas"; others, "I am of Christ."

Indeed, it is never hinted that James was really consanguineous with Jesus. We hold then that this term "Brother of the Lord" does by no means imply any family kinship, that it most probably designates a class of earnest Messianists, zealots of obedience, and we venture to set them in close relation with the Corinthian "Those of the Christ."[12] Surely if a sect of early Messianists were known as particularly "They of the Christ," it is highly likely that they or some similar group should be known as "Brothers of the Lord" or of "Jesus." Especially does this seem in-

[12] οἱ τοῦ Χριστοῦ.

trinsically probable when we remember that there is no evidence that this name was employed before the notion of the earthly human life of Jesus was already established or at least establishing itself. That zealots should then call themselves and their earlier leader "Brothers of Jesus" is no stranger than that Loyola should found the "Society of Jesus." Besides we must never forget that names of the Christians did greatly abound, such as Saints, Disciples, Called, Elect, "of Paul," "of Peter," "of Christ," Nazaræans, Gnostics, the Perfect, Pneumatics, and others. From all of which we conclude that the phrase in question, no matter when first used, nor by whom, nor of whom, by no means implies any kinship or furnishes any proof of the pure-human character of Jesus.

The next reference to Christ by a profane writer is found in Tacitus:[13]

"Sed non ope humana, non largitionibus principis aut deum placamentis decedebat infamia, quin iussum incendium crederetur. Ergo abolendo rumori Nero subdidit reos et quaesitissimis poenis adfecit, quos per flagitia invisos vulgus Christianos appellabat. Auctor nominis eius Christus Tiberio imperitante per procuratorem Pontium Pilatum supplicio adfectus erat; repressaque in praesens exitiabilis superstitio rursus erumpebat, non modo per Iudaeam, originem eius mali, sed per urbem etiam, quo cuncta undique atrocia aut pudenda confluunt celebranturque. Igitur primum correpti qui fatebantur, deinde indicio eorum multitudo ingens haud proinde in crimine incendii quam odio humani generis convicti sunt. Et pereuntibus addita ludibria, ut ferarum tergis contecti laniatu canum interirent, aut crucibus adfixi aut flammandi, atque, ubi defecisset dies, in usum nocturni luminis urerentur. Hortos suos ei spectaculo Nero obtulerat et circense ludicrum edebat, habitu aurigae permixtus plebi vel curriculo insistens. Unde quamquam adversus sontes et novissima exempla meritos miseratio oriebatur, tamquam non utilitate publica sed in saevitiam unius absumerentur.—*Annals*, XV, 44.

With respect to this famous passage we must observe first, that *if it be genuine*, it was written in the first quarter

[13] For the translation and the context see *infra*.

of the second century, near the close of the last work of the great historian, most probably after the death of Trajan (A. D. 117). At the most then it records only a report accepted at that time among Christians. Now it is not at all strange that the fiction (if it be a fiction) of the death under Pilate should be current at that date, nearly three generations after the feigned event. If such a report originated at all, it originated (gradually to be sure) at some time most probably in the first century; it may easily then have obtained currency and reached the ears of Tacitus before A. D. 110. Its reproduction, at his hands, then, merely attests its existence at that date, but in no degree attests its correctness.

Thus far on the supposition that the passage proceeds from Tacitus;—we need make no other supposition for the purposes of our argument. Let it be genuine, if you will; it proves nothing that is worth debate. Since he has never attached any argumentative importance to the passage, the mind of the writer may be fairly supposed to be in a measure unprejudiced, and as a mere matter of critical candor he must not disguise from the reader that he most gravely doubts its genuineness. It has indeed been speciously contended of late that Poggio Bracciolini was the author of the *Annals*,[14] but there are very cogent reasons against this contention. This whole section, however, reads very much like fabrication or at least emendation of a Christian hand. Among other suspicious circumstances may be noted the following:

A. Such a remarkable persecution as here described, and such a passage from such an author, must have deeply impressed the early Christian mind. There is nothing else nearly equal to either in pagan history and literature of that century. We should expect them to stand out con-

[14] *Tacitus and Bracciolini. The Annals Forged in the Fifteenth Century*, London, 1878.

spicuous in the memories and memorials of the following generations. We know how zealously the data of martyrdom were cherished and even invented at an early period. It is inconceivable, then, that an event so supremely memorable should have escaped all record and all reference. Yet what is the state of case? *Early tradition is absolutely silent about both the Neronian persecution and the Tacitean testimony.* Paul would seem to have been in Rome about that time (A. D. 64). Surely he would have been involved someway in the proceedings. Yet there is no allusion to any part he played in the tragedy. True, in 2 Tim. iv. 6, 7, we read, "For already I pour myself out as offering, and the time of my dissolution is come; I have fought the good fight, have finished the course, have kept the faith; henceforth is laid up for me the crown of righteousness which the Lord shall give me in that day, the Just Judge, and not only to me but to all who have loved his appearing." But in verses 16 and 17 the scene shifts suddenly: "At my first defense none was for me, but all forsook me—let it not be reckoned against them—but the Lord stood by me and strengthened me, that through me the preaching might be fulfilled and all the nations hear: and I was delivered from (the) lion's mouth. The Lord will deliver me from every evil work and will save me unto his kingdom the heavenly."

Again in verse 11 all have deserted him but one: "Luke only is with me." But in verses 19-21 he is surrounded by a numerous company, "Eubulus and Pudens, and Linus and Claudia, and the brethren all." Out of such contradictions nothing can be made, save only that there is no hint at anything like the Neronian persecution. The writer or writers seem not to have known any tradition concerning it, which they could work into these pastorals.

The first Epistle of Peter, addressed to the elect of the dispersion in Northern Asia Minor, is much concerned with

the persecution and "fiery trial" that has overtaken them, but though apparently written from Rome ("Babylon," v. 13) it contains not the remotest reference to the "fiery trial" through which it is supposed the church there had passed. Some reference, however, under such circumstances, would seem to be so natural as to be almost inevitable.

Not even in the Apocalypse do we find any clear or even probable allusion to an event that would have bulked so hugely in the early Christian consciousness. On this point we need not enlarge; enough to refer to the works of Mommsen and Neumann; even Furneaux admits that "The supposed references....are certainly in great part to be otherwise explained," though he still thinks there "are points in which such allusions can hardly be excluded," an opinion that seems to be the last remnant of departing prejudice. Why then did the Apocalyptist not refer to this tremendous persecution distinctly or at least unequivocally, if he had ever heard thereof?

Turning now to Clement of Rome, we find him (C. 5) very naturally setting before the eyes of his correspondents "the noble examples that belong to our generation." The fierce persecution detailed by Tacitus must have been perfectly known to him, yet he seems never to have heard of it. The sufferings of Peter he attributes to "unrighteous jealousy." "Not one nor two but more trials he underwent and so having borne witness he fared to the appointed place of glory. By reason of jealousy and strife Paul exemplified the prize of patience. Seven times cast into bonds, exiled, stoned, made preacher both in east and west, he received the noble renown of his faith, having taught the whole world righteousness and come to the bounds of the west, and having borne witness before the rulers, so he departed from the world and fared unto the holy place, having become a chiefest pattern of patience." We do not

pretend to know the exact meaning of such words; it seems doubtful whether Clement himself knew. But it seems certain that they convey no hint of the Neronic persecution as described in the Annals; nay more, they seem to imply unmistakably that their author had never heard of any such "fiery trial."

Passing to the "Ignatians," we find the letter to the Romans written in a style and mood of extreme exaltation. "Ignatius" yearns passionately for the arena, he longs to be ground as wheat by the teeth of wild beasts. Surely if he had ever heard of the terrible experience of the Romans themselves such a rhetorician would have let some hint escape him. But he does not, and his silence appears to admit of but the one and the same explanation.

It is superfluous to pass in review the other Christian writers of this era. They are consistently dumb on the subject under discussion, and their collective stillness makes the argument from silence as convincing as in the nature of the case it ever can be.

Far down the stream of history, over one hundred years from the date of the conflagration, we find at last, in a fragment quoted by Eusebius (*H. E.* IV, 26) from a *Libellus* addressed to Antoninus (Aurelius) by Melito, Bishop of Sardis (near A. D. 170), the first Christian allusion to Nero as an enemy of Christians. It declares: "For *what has never before happened,* the race of the pious is now suffering persecution, being driven about in Asia by new decrees. . . . for our philosophy formerly flourished among the barbarians, but having sprung up among the nations under thy rule, during the great reign of thy ancestor Augustus, it became to thine empire especially a blessing of auspicious omen. And the most convincing proof that our doctrine flourished for the good of an empire happily begun, is this—that there has no evil happened since Augustus's reign, ... only Nero and Domitian, per-

suaded by certain calumnious men, wished to slander our doctrine, from whom also it has come to pass that the falsehood has been handed down by unreasonable custom of information ('sycophancy') against such (Christians)." One moment we may pause to note that the good bishop goes back to the reign of Augustus for the origin of "our philosophy," which had already existed among the "barbarians" (i. e., the Jews,—Tatian calls the Jewish Scriptures "barbaric,")[15] and which must then have been essentially monotheism,—and then we observe that he has apparently *no knowledge and no idea* of the Neronian persecution as now set forth in Tacitus, and that he is arguing that good emperors have tolerated while only the wicked have discountenanced Christianity. Hence he adds: "But thy pious fathers corrected their ignorance, having frequently rebuked in writing many who dared to attempt new measures against them"—in evidence whereof he refers to Adrian's Epistle to Fundanus and to many others.

No new furrow need be driven through the field so well plowed by Keim, Overbeck, Mommsen, Schiller, Lightfoot, Ramsay, and others. It is enough that Melito, who seems to have been so exceedingly well versed in the relation of Christianity to the state, still gives no hint of anything resembling the Tacitean persecution. And yet to do so would have suited the purposes of his argument admirably. With great force he could have said: "Nero the matricide, the worst of men, Nero did indeed persecute us atrociously, to hide his own iniquity, as your own historian Tacitus bears witness, and behold what swift and just and terrible vengeance overtook him!" How could Melito have failed to make such a telling and obvious point?

Another descent brings us to Tertullian, who admittedly knew and made use of Melito's booklet in his own *Apologeticum*. His argument is the same, that good govern-

[15] In describing his own conversion (Address to the Greeks, c. 29).

ment favored and bad government disfavored the Christians, but he is far more reckless in assertion. He declares (C. 5) that "Tiberius, when intelligence reached him from Syria Palestine of what had there revealed truth of Divinity itself, reported to the Senate with the weight (*praerogativa*) of his own vote. The Senate, because it had not itself tested, rejected (his proposal); Cæsar maintained his judgment, threatening peril to accusers of Christians." Let the reader not be surprised at such history made to order. "Consult your records (*commentarios*), there you will find Nero the first that raged with Cæsarean sword against this sect when rising most at Rome. But in such a founder of our condemnation we glory even, for whoso knows him can understand that only something signally good was condemned by Nero. Domitian too made trial, a portion of Nero in cruelty, but being also man readily he checked his own beginning, restoring even whom he had banished. Such always our persecutors, unjust, impious, base, whom you yourselves are wont to condemn, those condemned by whom you are wont to restore."

Here one begins to suspect that Nero is made to play the rôle of persecutor only because he was so perfectly suited to the part. But even Tertullian reveals no notion of such a Neronian persecution as we read of in Tacitus. Yet he was acquainted with this historian, whose *Historiae* he cites at length (C. 16), on whose name he puns, whom he cordially hates for defaming the Jews. Had he read of Nero's burning the Christians alive, would he have used such vague and commonplace imagery as "raged with Cæsarean sword" and "through Nero's cruelty they sowed Christian blood"? Remember that Tertullian was a rhetorician to his finger-tips—would he have neglected such an exceptional opportunity for the display of his thrice-favorite art?

It seems needless to discuss still later testimony, as that

of Lactantius (*De mort. persec.* 2), of Origen (*Eus. H. E.* III, 1) of Eusebius (*H. E.* II, 25), and of Jerome; these late writers have at last learned after two centuries or more of ignorance that Peter and Paul fell victims to Neronian fury, but they still have no idea that Nero falsely accused the Christians of setting the city on fire, nor do they hint that a "vast multitude" lit up the Roman night with the flames of their burning bodies. Not until the fourth century, in Ep. 12 of the forged correspondence of Paul and Seneca, do we read that "Christians and Jews, as if contrivers of (a) conflagration, when put to death are wont to be burned." But even here the allusion, if there be any, to the Neronian persecution is extremely vague.

It must be added that the Jews are here associated with the Christians, that they could hardly have been sharply separated in Rome A. D. 64, that they far more than Christians were open to the charge of hatred of the human race ("Against all others, hostile hate"—Tacitus, *H.* 5, 2), that they had already felt twice in Rome (under Tiberius and under Claudius) the weight of the imperial hand, that Lucan, Pliny, Persius, Seneca—all writers of that era, speak of the Jews with sharpness, never of the Christians, and it will appear practically impossible that they could have escaped in any such persecution as the Tacitean. But if they did not escape, if they suffered, this must have been known to their great historian and champion, Josephus, who was a young man at the time.

Now this writer in his Archeology (XX, 8, 3) protests against the gross inaccuracies and falsehoods of the biographers of Nero, both favorable and unfavorable, while disclaiming any intention to correct or supplement them in general; "But what things befell us Jews we shall exhibit with great accuracy[16] shrinking to show plainly neither our calamities nor our sins." If then even a few

[16] οὐ παρέργως.

Jews had fallen victims in the capital to Neronian calumny and savagery, there seems to be no doubt that Josephus would have known and noted it. Yet he gives not the slightest hint that any such rumor had ever reached his ears.

Here then we stand in presence of the unbroken and universal silence of over two hundred years concerning an alleged event of capital importance, transacted in the very center of knowledge and information and rumor, yet never once mentioned by any one among many whose especial interest it was to tell of it often and to dwell on it at length. Nor can any one suggest the slightest reason for this silence, for this studied suppression of a highly momentous and dramatic incident in a reign that was a favorite subject of historic delineation and that lent itself especially to high coloring and picturesque exaggeration. Such considerations seem ample to weight the scale heavily against the genuineness of the passage in question.

B. On looking more narrowly at the whole Tacitean context, we find that it suggests quite independently many doubts kindred and hardly less grave. The account of the great fire extends through six chapters beginning with the 38th: "Follows a disaster, whether by chance or by guile of the prince, is uncertain." A vivid description is given. Chapter 39 tells how Nero did not return from Antium till the flames approached (as they ultimately devoured) his house. He took instant and popular measures to relieve the homeless and destitute, but "without avail, since rumor had gone abroad that at the very moment of the city in flames he had gone upon a private stage and sung the Fall of Troy, likening present ills to ancient calamities." Chapter 40 tells of the end put to the conflagration at foot of the Esquiline, and of its second outburst involving fewer deaths but more widespread destruction. Chapter 41 enumerates some of the elements of the fearful loss. Chapter

42 tells how "Nero made use of his country's ruins and erected a house" in which the genius and audacity of Severus and Celer would defiantly outvie the prodigality of Nature herself. It seems plain that the immense achievements and immenser conceptions of these architects and landscape gardeners must have required years for their elaboration and even partial execution. Chapter 43 tells of the rebuilding of Rome itself not in the old irregular fashion, but "with rows of streets measured out, with wide-wayed spaces, with limited height of buildings, and areas laid open and colonnades added to protect the frontage of the tenements (*insularum*)." This description is elaborated and what part Nero took in the rebuilding is emphasized. These changes pleased in general both by their utility and by their beauty, though some there were that said the old was better.

A city can not be rebuilt in such substantial fashion ("with stone from Gabii or Alba, impervious to fire") in a day or month or year, nor without enormous outlay of money, and the imperial treasury seems to have borne the weight of the expense. It is not strange then but nearly inevitable that the next chapter should continue thus: "Meanwhile by contributing funds Italy was laid waste throughout, provinces subverted and allied peoples and whatever states are called free. Even the gods fell a prey to this plunder," their temples being robbed of gold and votive offerings and even the images of the gods themselves.

It appears then that chapter 45 is the natural and almost inevitable continuation of chapter 43, stating the necessary consequences of the methods and aims of Nero as therein set forth. Between these two chapters thus so closely united in thought we now read chapter 44, *which has no intimate connection with either.*

"And these things (the gradual Neronian rebuilding)

were provided by human counsels. Next (*mox*) were sought propitiations to the gods and recourse was had to the Sibyl's books, whence followed supplication to Volcan and Ceres and Proserpine, and Juno was propitiated by matrons, first in the Capitol, then at the nearest point of the sea, with water drawn whence the temple and image of the goddess were sprinkled; and sacred banquets and night-long vigils did the women celebrate who had husbands. But not through human effort, not through largesses of the prince nor appeasements of the gods did the ill report subside, but still the fire was believed (to have been) ordered. Therefore to get rid of the rumor Nero substituted as guilty and subjected to most exquisite tortures (those) whom hated for their abominations the populace used to call Christians. The author of this name, Christus, had been executed in the reign of Tiberius by procurator Pontius Pilate; and though repressed for the moment (this) pernicious superstition was breaking forth again, not only through Judea, source of this evil, but even through the capital where all things hideous or shameful pour together from everywhere and catch the crowd. Accordingly first were hurried away (to trial those) who confessed (the charge), then by information of these an immense multitude not so much for the crime of incendiarism as hatred of the human race were convicted (or conjoined, *convicti* or *conjuncti*). And to them perishing were added mockeries, (as) that clothed with hides of wild beasts they should die by mangling of dogs, or affixed to crosses or doomed to flames, and, when day had departed, should be burned for purpose of nocturnal illumination. Nero had offered his gardens for that spectacle and was exhibiting a circus show, mixing with the crowd in the garb of a charioteer or standing on a car. Whence although towards persons guilty and deserving the most exemplary punishment there arose pity, as if not for public

good but unto the savagery of one man they were being sacrificed."

Let the reader of this chapter thus literally translated judge whether it fits in with either chapter 43 or 45, which fall so naturally together. Let him note that the whole story is intrinsically improbable; that it implies a very old and long established and numerous church in Rome, and a hatred on the part of the people that seems at that time quite incredible; that no proper meaning can be attached to "were confessing"—confessing what? Arnold naturally replies, the charge of "firing the city." But that seems wholly incredible. Surely they had not fired it and would not lie against themselves. Ramsay thinks they confessed they were Christians, Von Soden even so translates it! Doubtless. But Christianity was not then a capital offense; it was only the crime of burning Rome that could bring down on them such condign punishment. Moreover these "first seized" not only confess but implicate an "immense multitude." In what? In firing the city? Impossible! They were not guilty. In being Christians? Equally impossible. There was not an immense multitude of Christians in Rome, and even if we understand only a few score by this *multitudo ingens* it seems impossible that the few first seized would betray the whole Christian community to such a monster as Nero. That would have been neither wise as serpent nor harmless as dove. Here then the story is unbelievable. Note again that the spectacle must have endured for a long time, else surely the Roman mob, used to such sights, would not have felt pity for a class of hated criminals who had burned two-thirds of Rome and caused unspeakable ruin and woe. And why do Suetonius (*Ner.* 38) and Dio Cassius (62, 16, 1) and Pliny (*N. H.* 17: 1, 1, 5), who all have no doubt that Nero himself ordered the conflagration, and who must have known of such a long continued slaughter of innocents, why do they

never even remotely allude to such a tremendous matter? Lastly, when did this persecution take place? Naturally one would suppose that the report started at once, while men's minds were wild with excitement, as did the rumor of Nero's fiddling mid the flames of Rome. But no one can gain such an idea from chapter 44, which mentions the report after the account of Nero's architectural reconstruction and indicates that he took severe measures not, as would be natural, in the heated state of public feeling, but only long after and because the report refused to abate. This is not indeed incredible, but it is certainly perplexing.

And what can be the force or reference of "meanwhile" (*interea*), with which the next chapter opens? If we omit chapter 44, the reference is obvious, the term is so appropriate as to be almost unavoidable: Nero was rebuilding Rome on a scale of unexampled grandeur at incalculable outlay of imperial treasures. "What an abyss of expense! Whence came the necessary funds?" involuntarily exclaims the reader. The author answers: *Meanwhile* Italy, the provinces, the allies, the free states, the very sanctuaries of the gods were devastated to meet the prodigious cost. Now insert chapter 44. At once the connection is broken, the thought is left hung in the air, extraneous and remotely related matters distract the attention, and when the subject is resumed in chapter 45, there is found nothing in chapter 44 to which the "meanwhile" can refer—for it is unreasoning to say "Nero was burning Christians and the people were moved to compassion, meanwhile the empire was plundered." We must go back to chapter 43 to find the natural attachment for chapter 45—a clear indication that the intervening chapter has been interpolated.

C. Does some one (as Von Soden) object that the style is too Tacitean not to be genuine? We reply that quite as good imitations are frequent enough. In his *Letters to*

Dead Authors Mr. Andrew Lang has reproduced admirably a dozen widely diverse styles, none of them at all like his own. Such a *tour de force* is exceptional, but it shows that the limits of possibility in such matters are very wide. Besides, are we sure that the style is really so much like that of Tacitus? Careful scrutiny has perhaps not yet been made, but there are certainly counter-indications. We pass over the well-known facts that the text is here particularly wavering; that it is strange that Tacitus should speak of Pontius Pilate merely as procurator, without specifying of what, whereas such a form of speech was most natural for the interpolator; that the extremely harsh judgment of the Christians is puzzling in the intimate friend of Pliny from whom he would almost surely have learned better; that the "vast multitude" is an exaggeration more than Tacitean and not at all paralleled by the *iacuit immensa strages* of *An.* VI, 19,[17] and we would fix attention solely on one purely stylistic consideration, the expression *humani generis.* The whole sentence has sorely vexed the wits of commentators, but especially these words. Muretus (following Faernus?) boldly strikes out the word *humani* and understands by *generis* the Christian race! Acidalius sees that this cannot be and accordingly alters *humani* into *Romani*: They were condemned for hatred of the Roman race! Indeed it seems almost impossible that Tacitus should have written *humani generis. Everywhere* else he writes *generis humani.*[18] It is in the last degree improbable that such a consummate stylist as Tacitus would here just this once deviate from his lifelong habit, especially as the inverse order produces with the

[17] The slaughter is called immense because it struck "all" (*cunctos*) the implicated friends of Sejanus, without regard for age or sex or other conditions; but a multitude is huge only by its mere number.

[18] As *Ann.* III. 59, XII. 14, *Hist.* I, 30, III. 68, V. 25, *Ag.* 2. Editors in general make no note of this fact. After this study was complete, the writer observed the remark of Nipperdey: "*humani generis,* Sonst sagt Tac. stets in der gewöhnlichen Ordnung *genus humanum.*"

foregoing word a disagreeable hiatus: *odio humani.* No very delicate ear is needed to perceive that *odio generis* is a much pleasanter collocation. Besides the whole weight of Tacitean related usage falls against the inversion. It is the fixed custom of the historian to modify *genus* by following and not preceding words. Thus *genus hominum* (three times, almost the same as *genus humanum*), *genus animalium, belli, militum, mortalium, mortis, questus pensi, orandi, maiorum, telorum, spectaculorum, belli, studiorum, pugnae, Arsacis, vitae,* and *generis regii.* Apparent exceptions to this rule are readily seen to be due to rhetorical considerations, especially to the desire to maintain the favorite order: adjective, genitive, (modified) noun, as in *omne mortalium genus* (*An.* XVI. 13), *novum officii genus* (*Hist.* I. 20), and to make emphatic, as in *oppidanum genus* (*An.* VI. 15), *pernix genus* (*Hist.* II. 13). We may affirm then with much confidence that the inversion in question of itself stamps the passage as not from the hand of Tacitus.

* * *

By three entirely independent lines of inquiry we are led to precisely the same result. Look at it as you will, the chapter wears the appearance of being interpolated. Indeed, it must be, not unless one of these signs fail, but unless they all fail, unless all are simultaneously and in the same sense misleading. Even if the doubt raised by each one of these separate inquiries were not very strong, even if it still left the chances two to one in favor of the genuineness, yet the chance that all three would thus simultaneously deceive would be only eight in twenty-seven, the chances would be nineteen to eight in favor of interpolation. We have no choice then. Coerced by this consilience of results, we *must* regard the passage as probably interpolated, unless there be some strong antecedent reason in favor of genuineness and against interpolation.

Herewith the references to Christianity in pagan literature before A. D. 150 are exhausted. After that date the Gospel story had certainly taken definite form; it is widespread among Christians, who are themselves numerous throughout the empire; it has certainly reached the ears of the heathen, and any number of allusions in profane writers would merely attest the currency of the Gospel story, but would supply no testimony whatever to its authenticity. It seems useless then to quote this literature any further. We close this scrutiny, therefore, with this result, already announced: *Profane history supplies no testimony whatever to the pure-human character of Jesus.*

In order to estimate properly the value of this *argumentum e silentio,* we must remember that apparently the profane writers could have had no motive in suppressing information if they possessed it. Christianity was for them merely a pernicious and despicable superstition,[19] they would have been rather pleased to trace it back to a criminal crucified in Jerusalem. On the other hand, it is unlikely that any reference by the pagans would have been allowed by the Christians to perish. These latter were very jealous of all such material of argumentation and cherished it, as is shown vividly by the admitted fact that they even invented it diligently.

Possibly the heathen may have felt little interest in the crucifixion, its antecedents and its consequents; but the same cannot be said of Josephus. As a Palestinian Jew, a professional historian and a chronicler, it seems altogether impossible that he should not have known or have heard of the Life and Death of Jesus. He tells us minutely enough if somewhat obscurely of John the Baptist (*Arch.* 18, 5, 2), but John was in no way comparable with Jesus. In fact, he

[19] The terms used by Tac. Plin. Suet. are strikingly alike and suggest, but do not prove, some kind of interdependence or common dependence: *Exitiabilis superstitio, superstitionem pravam et immodicam, superstitionis novae et malificae.*

fills his pages with events altogether trivial by the side of the words and deeds of the Nazarene. It is not only to us at this 1900 years' remove, in the perspective of history, that the events appear in such relative significance. There was nothing in the career of John to match the execution on Calvary: nothing to pair with the works of Jesus, minimize them as you may. If Jesus was pure-human, then he was an astounding personality, in name and fame the Baptist must have been comparatively insignificant. Consider, too, how closely the twain were related, the Forerunner and the Messiah. For the gossipy annalist to know of John, but not of Jesus, would be as if the contemporary historian of the Reformation should know of Zwingli but not of Luther.

We dismiss then the hypothesis that Josephus was ignorant of the Christ, if the latter was pure-human, as altogether impossible. But knowing of him, could he have passed him by in silence intentionally? It seems hardly possible. If Josephus was a Christian (in secret), surely he would let pass no such opportunity to do his faith inestimable service. If he was sincerely an orthodox Jew (as almost certainly he was, so the Christian writers themselves attest), he must have believed that his countrymen did right in rejecting the pretender, he must have rejoiced in their action,—why then suppress it? Or even if he was uncertain in mind, then he must have pondered the matter, must have deemed it of high importance, and as it occupied his thoughts, why did he forbear all expression? No! we can not understand the silence of the historian, except on the supposition that Jesus was unknown to him historically. It was precisely this circumstance that puzzled the Christians themselves of the early centuries and induced one of them to cut the Gordian knot by interpolating the section 3. In fact, the marvel would be if some one had not made just such an interpolation. As already observed,

such insertion of apt material at proper places was a favorite form of that early logic.

Bishop Lightfoot admits with apparent irritation that Josephus has preserved a "stolid silence about Christianity," but thinks this "can not be owing to ignorance, for a sect which had been singled out for years before he wrote, as a mark for imperial vengeance at Rome, must have been only too well known in Judea." Of course, the allusion is to the Neronic persecution, and the reasoning sounds plausible. But we have just seen that this persecution is a matter for the very gravest doubt. Moreover, we see no reason why the Messianic agitators in Rome should take their cue from Palestine, or why the name Christian might not have been known in Rome even earlier than in Palestine. In fact, the name was not Palestinian, if we may believe Acts xi. 26,[20] it was applied to the Disciples at Antioch and was for an uncertain period only on the lips of enemies (not, however, *Christians* but *Chrestians*).[21] We see, indeed, no reason why such a movement might not have started independently in various places and nearly simultaneously. That there was originally any unity or central dependence in the propaganda is decisively negatived by Acts in more than one place, as already set forth in *Der vorchristliche Jesus*. It seems unquestionable that the greatest variety of faith prevailed in the early communities; from Rome to Jerusalem no inference is allowable.

Much more, however, not only does the fact that the Gentile called groups of the new faith by the contemptuous name of "Chrestians," by no means imply that these recognized the name and thought of themselves as distinct from Jews and proselytes, but the opposite seems attested by Acts xxi. 26, where it is said to Paul, "Thou seest, brother,

[20] Cf. xxvi. 28; 1 Peter iv, 16.

[21] From Χρηστός = Χριστός, Blass, *Gram. N. T. Grk.*, pp. 8, 63.

how many myriads there are among the Jews of them that have believed, and all are zealots for the law." These then had by no means separated themselves from the faith of their fathers, they were still one with the people.

If then Josephus knew of Christianity in Palestine, as is likely, he knew of it as one among many shades of religious enthusiasm or conviction, which had not detached itself from the general mass, which had not yet taken definite shape and outline. As thus inchoate and nebulous or confounded with the Essenes, it may have appeared to him of little significance and easily have been passed over when he treated of the principal sects of Jewish philosophy (*B. J.* II, 8, *Arch.* XVIII, 1). *It is only when we assume the current hypothesis concerning the origin of Christianity,* that the silence of Josephus appears strange and "stolid." But if it came not by observation, so that one could say "Lo here!" if its coming was like the gentle play of summer lightning, illuming the whole circuit of the Mediterranean, shining all round nearly simultaneously, it may very well have long escaped recognition as a distinct phenomenon. Especially if, as seems now to be proved decisively,[22] it was in large measure a *mystery*-religion propagated in great secrecy, if it was first heard in the ear and only much later proclaimed on the house-top,[23] if the "beautiful deposit"[24] of doctrine was committed to the novitiate under solemn and awful circumstances and only after "the beautiful confession" had been made under imposition of hands "before many witnesses,"[25] then such a secret cult carefully "guarded" might long escape the notice or at least the interested attention of a Josephus. Such reflections seem to break completely the force of the great bishop's argu-

[22] In the writer's forthcoming book, *Ecce Deus.*

[23] Matt. x. 27; Luke xii. 3.

[24] παραθήκη, 1 Tim. vi. 20; 2 Tim. i. 12, 14.

[25] 1 Tim. vi. 12-13.

ment, of which the sinew lies in the tacit assumption of all that theory of the beginnings of Christianity which we set out to disprove.

How then shall we sum up the situation? Thus:

a. It is morally certain that the Josephine passage (*Arch.* XVIII, 3, 3) is a Christian interpolation.

b. The Josephine passage concerning James (*Arch.* XX. 9, 1) has certainly been tampered with by Christian hands and as it now reads is almost surely an interpolation.

c. The chapter in Tacitus lies under the very gravest suspicions.

d. The sentences in Suetonius *may be* genuine, but they attest nothing strictly relevant. Like may be said of the Pliny-Trajan correspondence.

e. Even if the utmost should be conceded to these pagan authorities, they would still bear witness to two things only: (1) That so early as Nero there were so-called Christians or Chrestians in Rome, and that they fell under the extreme displeasure of that emperor. (2) That so early as perhaps A. D. 117 the origin of the Christian Cult was referred to a Christ that was said to have been crucified in Judea by Pontius Pilate (say A. D. 30), 80 or 90 years, nearly three generations, before.

Further than this these profane depositions do not go. It is seen at once that they do not touch the real point at issue, and we may now re-state as fully proved our first thesis: *Extant profane literature is silent concerning the life, career, and death of a pure-human Founder of Christianity.*

But may there not be non-extant profane testimony, over which the oblivion of centuries has settled? Impossible! For remember that the Christians were keen-witted and numerous, that they were nurtured in age-long controversy, that they had every reason, incentive, and opportunity to preserve any and every profane witness to the

traditional origin of their system, which would have been invaluable in their debate with unbelievers. Men like Justin who peered into every cranny and crevice of Scripture for confirmation of their story, like Clement and the apologists who ransacked every corner of pagan literature for materials of argument, like Melito and Tertullian and the whole industrious hive of interpolators and pseudonymists who invented history and scriptures wholesale as needed, —not six generations of these one and all would have neglected or overlooked any and every profane testimony in their own behalf, when even a single one would have been the end of controversy.

No! The fact that no Christian writer cites any such testimony is decisive proof that there was no such testimony to cite, and we may now finally affirm that the negative external witness, of contemporaneous history and literature, is as clear, as strong, as complete, as conclusive, as in the nature of the case it is possible for such witness to be. The negative internal witness, of the New Testament itself, has already been found to be eloquent and unequivocal. Positive counter-proofs in great number and variety all converge like meridians upon the same thesis. In a word, the pure-human Jesus of the critics is denied and the Divine Jesus of Proto-Christianity is affirmed by every form of consideration that has yet been adduced. What else is needed to shape the judgment of unbiased reason?

ADDENDUM.

The reader may not unnaturally ask, "But what has the illustrious Guglielmo Ferrero to say on this subject?" His notable work on the *Greatness and Decline of Rome* comes down to A. D. 14, just half a century short of the Conflagration, but elsewhere, as in his Lecture on Nero (*Characters and Events of Roman History*, pp. 103-141), he glances at the flames, though scarcely with a severely

critical eye. "The history of Cæsar's family, as it has been told by Tacitus and Suetonius," he expressly rates as a mere "sensational novel, a legend containing not much more truth than the legend of Atrides" (p. 138); and yet, strange to say, precisely where this novel is least credible, where it ceases to be intelligible even, and where the apparent attestation is reduced one-half, being that of Tacitus alone unsupported by Suetonius, precisely there he accepts it eagerly, not merely at par but rather at a premium, and without the smallest grain of critical salt to save it. Witness the following quotations:

"An inquiry into the causes of the conflagration was ordered. The inquest came to a strange conclusion. The fire had been started by a small religious sect whose name most people then learned for the first time: the Christians.

"How did the Roman authorities come to such a conclusion? That is one of the greatest mysteries of universal history, and no one will ever be able to clear it. If the explanation of the disaster as accepted by the people was absurd, the official explanation was still more so" (p. 131).

And again: ". . . .but it certainly was not philosophical considerations of this kind that led the Roman authorities to rage against the Christians. The problem, I repeat, is insoluble. However this may be, the Christians were declared responsible for the fire; a great number were taken into custody, sentenced to death, executed in different ways, during the festivals that Nero offered to the people to appease them. Possibly Paul himself was one of the victims of this persecution" (p. 133).

"Behold how small a fire how great a wood enkindles!" How much more about this "inquiry" and "inquest" does Ferrero know than did Tacitus, and yet Tacitus is Ferrero's only authority, and that too an authority already emphatically discredited as "a sensational novel"! The plant of History would seem to be a hardy annual and at times

might be likened to a grain of mustard seed. It is interesting to surprise it now and then as it grows.

But the important point is that the brilliant Italian distinctly and repeatedly declares "the problem is insoluble." And well he may. For while no one will question the keenness of his analytic faculty or the vigor of his reconstructive imagination, yet even these and more can hardly avail to make clear the general detestation of the few "pious idealists" whom "the people used to call Christians" while the same name had never yet been heard "by the most of the people"; or to explain how "a great number" (strictly "an immense multitude"—as Church and Brodrib render it) could be sentenced and executed out of "a small and peaceful congregation."

Gibbon and more especially Schiller have argued that it was the Jews who were slaughtered in such numbers and amid such torments. Impossible, as we have seen; for in that case Josephus would have known and made mention of such a calamity to his countrymen. And why should Tacitus commit the blunder of substituting the nearly unknown Christians for the familiar Jews? Others have guessed that the Jews under the patronage of Poppæa incited Nero against the Christians—their own kinsmen! But not only is this conjecture a wholly gratuitous calumny on the Jews, but it presupposes a bitter hatred and an ancient grudge of Jews against their Christian brothers, such as was unreal and impossible at that time even in Jerusalem, much more among the liberal Jews of the Dispersion (Compare Acts xxi. 20, xxviii. 17-25). Moreover, if the Jews had slandered the Christians in such infamous and ruinous fashion, why does not at least one among so many Christian authors, all of whom would have eagerly exploited any such fact or any such rumor, make some mention or give some hint of such a prodigious iniquity? No! Ferrero is right, and his admission is sig-

nificant: it is quite impossible to understand the "mystery" of the Tacitean passage regarded as genuine, "no one will ever be able to clear it." What then is the obvious suggestion? Is it not that the incomprehensible chapter is spurious, or at least altered beyond recognition from some unknown original?

The temptation is great to hazard some speculation as to the genesis of this chapter (44), and to connect it with the strange fortunes of the *Annals*, as preserved in the two unique Medicean manuscripts; however, we will not put forth upon any such sea of conjecture, but will hug close the safe shore of Ferrero's avowal that the assumed "genuineness of the passage in Tacitus,"—so far from being "not open to reasonable doubt,"—confronts us with an insoluble riddle, "one of the greatest mysteries of universal history."

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PHILOSOPHY IN FRANCE DURING THE LAST DECADE.*

TEN years ago I presented to the readers of *The Monist* a review of the philosophical works which had appeared in France during the preceding decennial period (1889 to 1899). I would like to offer them a similar sketch to-day. However, I shall not enter into specific criticism of the works as I did then, but shall limit myself to a simple review and shall merely mention certain names. My plan will be to indicate as far as possible the principle directions in which they are tending, the purposes which seem to control them, and to observe the sort of rhythm which impels workers in this field to treat their problems alternately according to different or even contradictory methods, which, nevertheless, end by correcting one another. Upon the vigorous impulses which lead us to attack the great questions face to face and in their entirety, follow the lesser ambitions which make us cling to details, to patient verifications, to minute analyses, even though occasionally proceeding by indirect paths.

* * *

The broad attempt at psychological interpretation of social facts—both political and economical—so brilliantly begun by the lamented Tarde seems almost abandoned since the death of its famous promoter.

Moreover it is true that his style was less suited to

* Translated for *The Monist*.

instruction than to personal research and that his vast syntheses can not always be accepted as such since they are often founded upon analogies which are too far fetched. But I have expressed myself before on this subject in these columns and I do not wish to be exposed to the charge of repetition.

After Durkheim, Tarde's most vigorous antagonist, had published his large works, he continued in *L'année sociologique* the application of the method for which he had formulated rules. Following him, his collaborators now direct their attention to the special processes of instruction and criticism; detailed studies abound in great number, particular questions are pursued as closely as possible (such as the study of sacrifice made by Hubert and Mauss); in short, research bears with preference upon precise facts definitely limited.

E. de Roberty, one of the combatants of the first rank, has now brought his voluminous work to a close. We might say that like Durkheim he differs from Comte, their common master, as much as he follows him. It has been his constant purpose to determine the subject matter of sociology, to discover in how far social facts are objective things, the material of abstract science or concrete, and how they may be studied apart from the subjective facts of consciousness. At this we are led to inquire whether psychology precedes sociology, or is itself derived from it, and in what measure—a problem of method and doctrine no less than of classification.

To Roberty there can be no doubt on this point. In his opinion psychology follows directly from sociology as a continuation of social data. He does not accept the extension of Ostwald's "energetic" laws to these data. They are only valid, he says, for composites (cosmo-biosocial), for concrete social data. But how can it be proved that these laws affect also the "social component" of these data?

In order to avoid all confusion it is important to draw distinctions with care. We must not interpolate the psychological method between the biological and the social methods for the psychological and social methods only duplicate each other. The social method constitutes alone the abstract method, the psychological method being merely its principal expression, or its simplest concrete externalization. This view which reverses the terms of the old relation will prevent us from falling back into the illusion either of the idealists or of simple materialism. The qualities of the soul will not directly explain social phenomena nor will mechanics furnish the direct explanation of psychical phenomena.

To sum up: Given psychical interaction as a special mode of universal energy, that is to say, the transformation of consciousness into cognition, of biological energy into superorganic energy, and we have the cause of what we call civilization.*

* * *

Nevertheless psychology, which thus becomes concrete for the sociologist, may be treated by psychologists as abstract. Or, if we prefer in order to avoid all contradiction of terms, psychologists have two chief methods of considering and investigating psychological data. They may legitimately consider those data (1) as detached from the individuals in which they are manifested, that is to say in general terms, by relating them to some leading or explanatory fact; or (2) as in the individuals themselves in the form of definite and particular phenomena.

According to the first of these methods we find general psychology preferably portraying either sentiments, ideas,

* Ostwald's energetics, a concept which solves the ancient antinomy between matter and energy, ought, according to Roberty, to be judged as a forward step of general logic, which evolves in some fashion at the same time that our collective (or socio-individual) experiences are increased. This approaches to some extent the concept of universal unity as logical or abstract monism, according to its philosophical conception.

or some other category of philosophical data in the light of an hypothesis or of a directing principle as Ribot has done in his "motive theory" or Fouillée in his "idea-energies" (*idées-forces*).

It was given to Ribot during these last years to accomplish the revision of the entire psychological domain. To his work, the most important which any psychologist has ever accomplished (as I have shown more than once in these columns), he now adds supplementary studies. Among these are his articles on the problems of affective psychology, and it is not necessary to point out once again the close relation which these bear to his general theory of the primacy of sensibility in contrast to the "intellectualist" views still defended by some psychologists.

Fouillée has continued to apply to the critique of psychological theories his principle of the "idea-energy" which is at the same time the "appetite" or "desire" of Spinoza and the "will" of Schopenhauer. His work cannot be put into the balance with that of Ribot; moreover the object of the two men is not the same. Fouillée presents a very general theory rather than attempting to write a psychology in detail, and proposes an interpretation of psychological data conforming to this theory, or, rather, to its application.

In certain respects it is not a good thing to have the study of psychical data depend too closely upon a philosophic point of view nor is it well for the observer to regard living reality in the light of his own prejudices or systems, because the new impressions that objects make upon him are confounded with former impressions in his mind and only an inaccurate and confused image can result. I do not mean in the least to imply that the doctrine, the initial hypothesis, should be a matter of indifference. Just as in chess there are moves leading nowhere that good players ld never make, so in psychology there are points of view

from which data are seen but indistinctly or in a false light. Such in Ribot's eyes would be that of intellectualism. Doubtless it would be as great a mistake to look to strictly mechanical theories for the only possible systematization of psychological data. Those who, with Bergson, regard the data from the point of view of a metaphysical idealism, or with Dwelshauvers, of an improved spiritualism, have pointed out the faults of pure mechanism. Some new studies on the function and diseases of language have led scholars like Dr. Marie and Dr. Moutier to recognize that the difficulties of language do not arise from the nerve centers but from the mind itself, and that they are disorders of the intellect and not of the senses. Being physiologists, these men do not declare for the primacy of the intellect but keep within the field of their investigations. But the results of their researches (which have invalidated the premature theory of Broca) ought to show once for all that psychological data constantly take us into the presence of "functions" which are not explained by the simple play of certain elements that analysis has succeeded in detaching from them.

Nevertheless analysis is not shorn of its value, and partial or even imperfect syntheses mark the necessary steps. Works of detail remain in favor among psychologists as well as among sociologists. Thus Paulhan, completing his studies on character, has treated of the *Morale de l'ironie* and of the *Mensonge de l'art*; Binet has turned his attention to pedagogic problems; Pierre Janet, G. Dumas, and Sollier to pathological states, to the emotions, association, etc. Van Biervliet, the distinguished Belgian physiologist, has summarized and given an appreciation of the state of laboratory research in his interesting *Causeries psychologiques* and in his *La psychologie quantitative,* a book of great value.

To these names it is proper to add several others:

Flournoy, Dugas, Revaut d'Allonnes, Grasset, Hartenberg, Mlle. Toteyko and Mlle. Stefanowska (a fine work on *Grief*), etc. I am forced to pass these over since I cannot give a complete review at this time.

* * *

I must not return to the works of Souriau and Griveau but just a word to call them to mind may be in order.

When Souriau discussed "rational beauty" (*Beauté rationelle*) and gave to art the idea of "perfection" he surely touched bottom at a certain depth but the surface is constantly changing. One can only enter the protest that the artist aims at a certain perfection; his only concern is that he be understood on the conditions of this perfection, that he define the value of the various elements that enter into the work of the painter, the architect and the musician! Nevertheless I gladly grant that in this way it is possible to show more clearly the relations between esthetics on the one hand and logic and science, intelligence and sensibility on the other; in other words to throw a brighter light on the special problems of art.

Grieveau set himself the task of discovering the principles that govern the adaptation of our internal rhythm to the rhythm of objects. He has dealt with the vast subject as a sincere poet of nature, treating it in various forms in writings which do not savor of the schools nor of lessons performed or assigned. His pages abound with valuable observations and useful hints, and permit an insight into a metaphysics grounded on the laws of a universal rhythm.

There is a new author of undisputed ability named Charles Lalo who in his turn approaches esthetics by a trenchant critique of the experimental school (*L'esthétique expérimentale contemporaine*) and by original studies in music (*Esquisse d'une esthétique musicale scientifique*). I have given an account of his theory in two somewhat ex-

tensive articles in the *Revue philosophique* and shall here indicate only its most essential features.

Two considerations appear in the foreground. One is a development suited to art, an internal dialectic by which music would develop independently of the secondary external conditions to which almost exclusively writers like Taine and Guyau give emphasis. The other consideration, which would seem at first to contradict the preceding, has to do with the dominant influence of society; for society alone has created the "values" of art, has systematized and prescribed the technique, that is, the totality of qualities required in each age in order that a work be considered as "good." The theory of Lalo becomes thereby a sociological theory according to which social activity, differently understood than in the old theories of environment and of the race, is employed here in helping and supporting the evolution of art from within, in establishing and prescribing the results of the dialectic that governs its evolution.

I have tried to apply these principles to the other arts, but the development of painting or architecture, for example, seems to be more dependent on external conditions than that of music which offered a kind of privileged case; and above all the "value" does not seem so strictly and constantly a "collective" thing as Lalo, following Durkheim perhaps too closely, would have it appear.

One of the reasons why I have enlarged upon his work is that it afforded me an opportunity to treat anew the delicate question of the relation of individual psychology to the so-called "collective" psychology. This problem has a place in every chapter of psychology since we would know nothing of our feelings, our ideas, even our logic, without the influence of society and the long continued education of our species. We have seen that in their own way sociologists also admit the question when they dispute

the rank of psychology in a classification. In fact, this problem is not only interesting from the theoretical side, it constantly arises in practical affairs under the guise of reciprocal obligations on the part of the individual and the state, of anarchy and government, and, let us add, of traditional morality and the so-called morality "of nature."

* * *

No question is discussed with more feeling just now than that of morality. It is so closely connected with the religious question that they can hardly be separated. We certainly can not pass by with indifference the controversies bearing upon textual criticism, traditionalism and modernism, etc. They enter upon the subjects of authority, of the church, historical origin of Christianity and of the various religions. But whereas they have a direct interest for only a rather limited public the general diffusion of their conclusions on the conduct of life has suddenly assumed extraordinary importance.

There has been no dearth in recent years of works devoted to the criticism of ethics and its leading conceptions, some authorities professing to dispense with ethics entirely or to regulate and systematize it. Suffice it to name among the philosophers the principal writers that have treated the subject from a broad point of view, viz., Fouillée, Lévy-Bruhl and G. Belot. Neither their methods nor their philosophy are the same. One discusses the value and content of a system of ethics, another proposes a structure modeled on his own theory. I shall not enter into a detailed examination, keeping myself to the question itself taken as a whole. As a matter of fact, when I come down from the leading authors to the writers of manuals or to second rate men, I cannot help a feeling of distress. I feel too strongly the ridiculous side, I see too clearly the puerility, the vanity of these attempts when the strength of the

effort does not bear witness to a loftier thought by which they are inspired and supported. The death of all morality, at any rate of the old-fashioned morality, will perhaps be the "fine spectacle" of which Nietzsche dreamed, that is reserved for our remote, if not our immediate, posterity; but it is certain that the immanent ruin of all duty and virtue, the upheaval of the fundamental institutions on which our society rests, are facts that are hardly reassuring and from which even now we see disquieting results.

Duties have their birth in social life, obligation is based on habit. These as I myself have frequently said, are the two essential characteristics of a positive morality. Moreover, it is necessary that the duties be felt, that the habits be formed and retained. And here difficulties arise. Even assuming that what duties were necessary for the welfare of society could be agreed upon (which is far from probable), there remains the question of how to impose them. The systems of morals that would fain be scientific confess themselves powerless here. Religious morality alone, whatever its doctrine may be worth, exerts a real authority of efficient constraints, and the reason is that it bases its precepts on truths undisputed by those who accept them, that it makes its appeal to faith. But the act of faith which gives to religions their power has its genesis in historical circumstances that cannot be artificially reproduced. Here lies the difficulty of an ethics independent of dogma. Not possessing the means of creating the faith which would give it life, we must have recourse to the demonstrations of reason,—a support all too frail in the eyes of the majority of mankind!

There could be no greater madness, therefore, than to wish to suppress by force the religious school, as our Jacobins, theorists or politicians try to do, because it is at least one of the sources from which moral habits arise. Such men by their "state-catechism" taught by priests

à rebours pursue an illusory unity, a fallacious harmony of minds. They dread the competition of the free school and ward off discussion, which however is not disease but life.

* * *

Extremes soon meet their counterparts. A fairly active reactionary tendency has betrayed itself for several years in favor of metaphysics (inclining toward idealism or spiritualism) against scientific materialism, or rather against the unwarranted employment of mechanical explanations when these hide too conveniently the blocks over which science still stumbles. One party of our young men follows Poincaré, another proclaims Bergson as its leader. In Bergson's work this party hails a restored metaphysics set forth with the charm of poetry but basing at least its bold propositions and clever metaphors on minute psychological analysis and a penetrating critique of cognition or of ideas.

Bergson reproaches science for seeing only the *immobile*; he wants to seize upon and feel *motion*, to see nature in a flux, and to this end he intends to place himself *inside* of things, no longer *outside* of things,—a difficult operation that obliges us, since we cannot get away from the conditions of cognition, subjective or objective, to proceed at the same time by both analysis and synthesis, by science and divination. But does not this attitude amount to explaining the external by the internal, the internal by the external? Would it not lead us to conceive things under new figures and to express them by new names rather than to explain them in a light that would cause them to be seen in a different way and more clearly?

So it comes about that the notion of duration as defined by Bergson implies increase and creation in time, and the notion of vital impulse signifies the force included in evo-

lution and, for the time being, covers appetite and will. But I have no desire to summarize or criticize such an extensive and careful book in the space of a few lines. I merely wish to indicate the important place it occupies and the direction which its philosophy indicates.

I shall not return to Binet's endeavors, of which I have spoken on former occasions at sufficient length, along the line of the relations between body and soul; nor shall I revert to the works of Le Dantec. Neither biologists nor metaphysicians, in short, have succeeded in making us see more clearly into the phenomena of *consciousness, intellect* and *instinct*. All one can say is that, in spite of many failures, our researches have resulted in placing us in a truer attitude toward the problems of life and the spirit. And surely this is of itself no slight advantage.

At bottom the problem of cognition remains one of the leading questions of modern philosophy. But our philosophers approach it in a very different way from that of their forerunners, and the problem itself seems to have assumed a different form. Whereas formerly the endeavor was made to investigate the *means* of cognition and to define its modes and scope, the aim in our day is rather to criticize the *results* (Poincaré), to estimate the true value of the laws of science and the validity of its hypotheses—a sort of expectant attitude that has with some exaggeration been called anti-intellectualism. I would see anti-intellectualism most particularly in the mystic theories of the unconscious and of instinct (Bergson) arising out of psychological studies and tending in effect to limit and reduce the rôle of the intellect.

In this chapter I must also mention some exceedingly interesting writers, curious and original minds, such as Jules de Gaultier, A. Chide, Boex-Borel (*Le pluralisme*). The opportunity to make them better known to my readers may present itself some day.

It is necessary to add that historical studies, dealing with an entire period or with certain philosophers considered separately have likewise not been wanting? Besides the *Collection des grands philosophes* which is growing rapidly, it may suffice to mention the very considerable work of Joseph Fabre, who conducts us from ancient thought to "modern thought"; that of François Picavet, who covers the Middle Ages; that of H. Delacroix, devoted to the mystics; the Vinci of Duhem, and of Peladan; the Kant of V. Delbos, etc.

I ought likewise to mention the attempts at collective work undertaken by separate sections and commissions in the *Institut générale psychologique.* Studies have been made with varying success in the psychology of animals (Perrier, Bohn, Hachet-Souplet) and the phenomena of spiritism (the extended report of J. Courtier). Special problems in esthetics have been broached beginning with a study of visual memory in the painter.

This activity is encouraging. I cannot, however, forebear a feeling of sadness at the approaching disappearance of the strong generation to which we owe the magnificent impulse and fine work of the last thirty years. A new generation is at our door that will gather the harvest in its turn. It will no doubt apply itself to testing the results achieved and to revising our provisional conclusions. May it succeed in adding largely to our common store!

LUCIEN ARRÉAT.

PARIS, FRANCE.

THE UNVERIFIABLE HYPOTHESES OF SCIENCE.

MORE and more the conviction grows and spreads, that science is or is to be the light of the world. The one supreme gift of education is or is to be the scientific attitude of mind. The problem of problems, therefore, is to understand, to make lucid, to make conscious, to make transmissible the essentials of scientific thinking.

The bond of harmonious world-life is the scientific habit of mind. How horribly we have been hypnotized by words and out-worn creeds, while even yet eighty percent of us die from causes completely preventable.

The marvelous objective contributions of science flare up on every hand about us. The chemist's coal-tar colors are not more vivid than the lurid light of electricity, now a household fairy with telephone and electric smoothing iron. While the X-rays reveal our very bones and wireless telegraphy pierces the blackest of ocean's tempests, we are unastonished while Sir William Ramsay and Madame Curie debate whether the dream of the alchemists, the transmutation of metals, has come true.

But these gemmed palaces uprising at the rubbing of the Aladdin's lamp of science, looked at only from without, unmastered, lend themselves only too readily to the aid of the false magician, dealer in the magic of words.

Calling Christ scientist was the shrewd appropriation and utilization by Mrs. Eddy of the universally growing conviction of even the densely unscientific that science is the hope of the world. Willingness to try the swallowing

of a cholagogue with so sympathetic a trade mark was actually stimulated by the real wonder-working of true science. Men and women can be charmed with words. Things, much more stubborn, bow only to the sovereignty of one kind of thought, the scientific. What then are the identifying characteristics of this the only lawful prince?

For example, wherein differ these three beliefs, the belief of the Coreans that epileptic fits are demoniacal seizures to be treated by trying to cast out the devils, the Mrs. Eddy contention that there is no sickness and the epileptic fits are only illusions caused by malicious animal magnetism, a suppositious entity relief from which she has actually sought in our law courts, and finally the position of the Japanese army-surgeons that an epileptic fit is a phenomenon produced by an abnormal explosive discharge of nerve force overflowing proper channels, self-limited as the flood from a bursting water tank, not stopped by the exorcising of a demon? An epileptic seizure is often preceded and heralded by a distinctly recognizable aura. Is the one who feels the oncoming stroke, to pray, to telephone for the police, or instantly to snuff up the nose the fumes from an uncorked bottle of nitrite of amyl?

From nothing assumed, nothing can be proved! Every conclusion supposes premises. But even the learned have heretofore not realized that the necessary hypotheses of science are of two distinct kinds. Every one has recognized those hypotheses which are valuable *precisely* because they are either verifiable or else refutable through definite appeal to the tests furnished by what we have called experience and experiment. However, what we call experience and experiment is not all. No scientist has ever been able to get on without hypotheses. But the essential thing is never to make them unconsciously, and the scientist of the past has here been a sinner.

The epoch-making revelation is that among the scien-

tist's necessary assumptions, both conscious and unconscious, are some of a kind hitherto unrecognized, of a genus wholly different from what he thought them, hypotheses wholly and forever indemonstrable, which experience and experiment, however interpreted, are eternally inadequate to prove. Once pointed out, the antithesis, the contrast between these two species of scientific hypotheses is strikingly abrupt. The routine scientist, taken unawares, would be tempted stoutly to deny the scientific importance, yea, the very existence in science, of hypotheses of this newly revealed type. What! a scientific hypothesis by its very nature incapable of proof! Far be it from him! Yet to these unrecognized friends he has owed, he owes all his success. From their stimulus, with their guidance under their protecting wings he has done all his work toward interpreting his experiments, his experience, his world.

Such a hypothesis, yet so long misunderstood, is Euclid's celebrated parallel postulate, familiar in Ludlam's form: Two straight lines which cut one another cannot be both parallel to the same straight line.

How easy this hypothesis! Why not prove it? Almost every man of science throughout the ages did try to prove it. Says Poincaré: "What vast effort has been wasted in this chimeric hope is truly unimaginable."

At last comes the new step. Says Lobatchevsky: "In the uncertainty whether through a point there is only one straight coplanar with a given straight yet nowhere meeting it, we will assume it may be possible that there are still other straights which do not cut the given straight, though coplanar with it and through the given point."

Here then we have Euclid's hypothesis characterized as a scientific assumption forever indemonstrable and therefore subject to direct, explicit contradiction, subject to replacement by an assumption flatly contradicting it.

Bolyai speaks just as explicitly of the system of geometry resting upon Euclid's hypothesis, and the system founded on the contrary hypothesis, that there are coplanar straights not both perpendicular to any third, yet which nowhere meet, straights which are asymptotes each to the other. And this Bolyai geometry is of a logic nowise inferior to the Euclidean.

Is, then, the Euclidean geometry true? This question, says Poincaré, has no meaning. As well ask whether Cartesian coordinates are true and polar coordinates false. But says Professor Roe, the sun will rise to-morrow and must rise in time and space.

Too late, my dear Professor, too late. Since the hypothesis of Copernicus, the sun does not rise, the earth rotates. Since the hypothesis of Bolyai, if it rose in geometric space it might be Lobatchevsky's, but it does not rise in a geometric or conceptual space. Such space is one, empty, homogeneous, continuous, unbounded, perhaps infinite, infinitely divisible, identical, invariable. But the where of physical motion, if we still insist upon calling it some kind of space, is perceptual space, hence multiple, filled, heterogeneous, perhaps continuous only for perception, perhaps finite, not infinitely divisible, variable. Our physical world is neither in Euclidean nor non-Euclidean space, for these are conceptual constructs. Geometric space is a construction by the intellect, made by methods entirely analogous to the ordinary ways in which we achieve our selfish purposes, and call the achievement truth.

The certainty of the science of geometry is only the certainty of deduction from hypotheses, and because of the final necessity of unverifiable hypotheses, we must now have some criterion other than proof. Here is one: Of alternative hypotheses is to be chosen the simplest now for us.

Man is the measure of all things. The debate, what

is truth? is a wrangle unless it gives precedence to the kenlore question, How can *reality* like a new planet swim into my ken? Then we find our knowing is ever subject to our wishing. As Schiller says: "At a blow it awards to the ethical conception of *Good* supreme authority over the logical conception of *True* and the metaphysical conception of *Real.* The Good becomes a determinant both of the True and of the Real. Our apprehension of the *Real,* our comprehension of the *True,* is always effected by beings who are aiming at the attainment of some *Good,* and it seems a palpable absurdity to deny that this fact makes a stupendous difference." That is clung to as real which has entangled itself in our emotional life. Could you induce a dear old lady to give up her conviction of the importance of circumcision and the devil? And I agree with her as to one and beg to differ as to the other.

How well I remember that when it was my privilege to study astronomy with Newcomb he showed that the Ptolemaic hypothesis was perfectly adequate for the calculation of eclipses, only too cumbersome as compared to the Copernican, while on the contrary the three Kepler laws offer no definite or complete solution of the problem of the movements of the heavenly bodies, their importance being that of the fabled apple, they hit the tremendous head of Newton.

John Bolyai it was who in 1823 first wrote down that quality of an infinite aggregate which in these latter days of tardy appreciation we have adopted as its definition: "An infinite aggregate is one equivalent to a part of itself."

You know the algebraic paradox that two equals one, an excellent way of justifying our convention that you must not divide by zero; but though only every other integer is even, yet for every number there is an even number,—the whole is not greater than its part—for every point on a yard there is a point on a foot.

The hypothesis of the uniformity of nature is unverifiable. Here it is: Reproduce all the conditions of a certain phenomenon, that phenomenon will reappear. Of this Dr. Carus has lately said: "It would be useless even as a working hypothesis; for, as Mrs. Warren truly explains, we can never reproduce the very same conditions a second time."

But Royce of Harvard, in his introduction to my translation of Poincaré's *Science and Hypothesis*, says of what, to fix the ideas, I here call okapi hypotheses:

"These are far less frequently recognized in a perfectly explicit way as useful aids in the work of special science. One usually either fails to admit their presence in scientific work, or else remains silent as to the reasons of their usefulness. Our author's treatment of the work of science is therefore especially marked by the fact that he explicitly makes prominent both the existence and the scientific importance of hypotheses of this second type. These hypotheses which can neither be confirmed nor refuted by experience appear partly (like the conception of 'continuous quantity') as devices of the understanding whereby we give conceptual unity and an invisible connectedness to certain types of phenomenal facts which come to us in discrete form and in a confused variety; and partly (like the larger organizing concepts of science) as principles regarding the structure of the world in its wholeness; *i. e.*, as principles in the light of which we try to interpret our experience, so as to give to it a totality and an inclusive unity such as Euclidean space, or such as the world of the theory of energy is conceived to possess. Those aspects of science which are determined by the use of the hypotheses of this second kind appear in our author's account as constituting an essential human way of viewing nature, an interpretation rather than a portrayal or a prediction of the objective facts of nature, an adjustment of our conceptions of things to the internal needs of our intelligence.

Unverifiable and irrefutable hypotheses in science are indeed, in general indispensable aids to the organization and to the guidance of our interpretation of experience. Characteristic remains the thought that *without principles which at every stage transcend precise confirmation through such experience as is then accessible the organization of experience is impossible.* They may therefore be described as hypotheses that, while lying at the basis of our actual physical sciences, at once refer to experience and help us in dealing with experience, and are yet neither confirmed nor refuted by the experiences which we possess or which we can hope to attain."

Three special instances or classes of instances may be used as illustrations of this general type of hypotheses. They are: (1) The hypothesis of the existence of continuous extensive *quanta* in nature; (2) The principles of geometry; (3) The principles of mechanics and of the general theory of energy. In the case of each of these special types of hypotheses we are at first disposed, apart from reflection, to say that we *find* the world to be thus or thus, so that, for instance, we can confirm the thesis according to which nature contains continuous magnitudes; or can prove or disprove the physical truth of the postulates of Euclidean geometry; or can confirm by definite experience the objective validity of the principles of mechanics. A closer examination reveals the incorrectness of all such opinions. Hypotheses of these special types are needed; and their usefulness can be empirically shown. They are in touch with experience; and that they are not merely arbitrary conventions is also verifiable. They are not *a priori* necessities; and we can easily conceive intelligent beings whose experience could be best interpreted without using these hypotheses. Yet these hypotheses are *not* subject to direct confirmation or refutation by experience. They stand then in sharp contrast to the scientific hypotheses of

the other, and more frequently recognized, type, *i. e.*, to the hypotheses which *can* be tested by a definite appeal to experience.

The central problem of the logic of science thus becomes the problem of the relation between the two fundamentally distinct types of hypotheses, i. e., between those which cannot be verified or refuted through experience, and those which can be empirically tested.

One value of unverifiable and irrefutable hypotheses of this type lies in the sort of empirical inquiries which they initiate, inspire, organize and guide. In these inquiries hypotheses in the narrower sense, that is, trial propositions which are to be submitted to definite empirical control, are indeed everywhere present. Yet without the "leading ideas" of science, that is, its principles of an unverifiable and irrefutable character, the hypotheses in the narrower sense would lack that guidance which the larger ideas of science give to empirical investigation."

And now from the cavayard of young giraffe and okapi found new-prancing in the fair field of modern dynamic, following here Poincaré's delineation, I shall cut out two for exhibition. *Voilà!*

What characterized the Newtonian mechanics? Simply this: Take a body at rest; give it an impulse, that is, impress on it a given force for a given time; the body starts to move and acquires a certain velocity. The body having this velocity, if we again impress the same force during the same time, the velocity will be doubled. If we still continue, the velocity will be tripled after we shall a third time have given the same impulse. Thus beginning again a sufficient number of times, the body will end by acquiring a very great velocity, which could surpass any limit, an infinite velocity.

In the new mechanics, on the contrary, we suppose it impossible to give to a body starting from rest a velocity

greater than that of light. What happens? Consider the same body at rest; give it the same impulse as before; it takes the same velocity. Repeat again this impulse, the velocity will augment, but it will not be doubled. A third impulse will produce an analogous effect, the velocity augments but less and less; the body opposes a resistance which becomes greater and greater. This resistance is inertia, is what we commonly call mass.

Everything happens, then, in this new mechanics as if the mass was not constant, but increased with velocity.

We may represent the phenomena graphically. In the Newtonian mechanics, the body takes after the first impulse a velocity represented by the sect Ov_1; after the second impulse, Ov_1 increases by a sect v_1v_2 equal to it. At each new impulse, the velocity increases by the same qantity; the sect representing it increases by a constant length. In the new mechanics, the velocity-sect increases by sects $v'_1v'_2$, $v'_2v'_3$,... which are smaller and smaller and such that we cannot exceed a certain limit, the velocity of light.

How have we been led to such a conclusion? Have we made direct experiments? The divergence would show only for bodies at high velocities; then alone the indicated differences would become sensible.

But what is a very high velocity? Is it the speed of an automobile going at the rate of 100 kilometers per hour? On the road we go wild at such speed; but for the present view-point this is a snail's pace. Astronomy serves us better. Mercury, the speediest of the heavenly bodies, also goes about 100 kilometers, not per hour but per second; but still that is not quick enough; such speeds are too slow to reveal the differences we would observe.

I shall not speak of cannon balls. They are faster than automobiles, but much slower than Mercury. But you know we have discovered an artillery whose projectiles are

quicker far: I mean radium, which shoots out energy projectiles, in every direction. The rapidity of the shot is greater far; the initial velocity is about a hundred thousand kilometers per second, one-third the velocity of light. The caliber of the projectiles and their weight are, it is true, less formidable, and we must not count on this artillery to increase the military strength of our armies. Can we experiment on these projectiles? Such experiments have actually been undertaken. Under the influence of an electric charge, of a magnetic field a deviation happens which permits taking account of inertia and measuring it. It has thus been established that mass depends upon velocity, and the following law has been enunciated: The inertia of a body increases with its velocity which remains always less than that of light, 300,000 kilometers per second. In other words, for this non-Newtonian dynamics a constant force acting upon a moving body does not impart equal increments of velocity, equal accelerations, in equal times, say in each successive second; but the accelerative effect decreases as the velocity increases, and this has for limit the velocity of light. There can be no motion swifter than that of light, about 186,330 miles per second, a very tiny number, while on the other hand the mass of ever so little a body approaches absolute infinity as the measure of its speed approaches this trivially tiny number. Surely this dwarf and giant annex to the staid old Sir Isaac Newton museum, though masquerading as the outcome of experiment, is as bizarre as the okapi of Sir Harry Johnston, defined in the last of the two splendid new volumes of the *Century Dictionary* as having the upper parts dark purplish brown; forehead and ears reddish; sides of face nearly white; legs buff, the flanks and upper parts marked with horizontal blackish stripes resembling those of a zebra,—certainly a color scheme run mad.

Yet after all, this non-Newtonian mechanics owns an-

other hypothesis not less surprising. A body in motion of translation undergoes a deformation in the line of its displacement; a sphere for example, becomes a species of flattened ellipsoid with the shorter axis parallel to the translation. If such a transformation is not seen every day, this is because it is so minute as to be almost imperceptible. The earth revolving in its orbit deforms itself about one two hundred millionth. To observe such a phenomenon instruments would be needed of precision extreme; but were their precision infinite it would not help, because, carried themselves in the movement, they would undergo the same transformation. We should see nothing. The meter we could use would shorten like the length we measured.

Yet even this has not been accepted as settling the species of this bizarre creature. It is claimed that Michelson has shown it to be not okapi but giraffe by verification, and largely this won him the Nobel prize, forty thousand dollars.

Finally, the notion of constant mass of a body having vanished, having evaporated, what becomes of Newton's law of gravitation?

Motion plays havoc with it, and Lorentz has replaced it by a new law of attraction containing the velocities of the two bodies as parameters.

The greater the velocities, the greater the difference between Newtonian and non-Newtonian.

Now of all the planets Mercury has the greatest velocity, and just Mercury presents an anomaly not yet explained: the motion of its perihelion is more rapid than the motion calculated by Newton's law. The acceleration is about 38″ too great. Now the Lorentz law of gravitation would make the acceleration greater than that given by Newton's law.

GREELEY, COLO. GEORGE BRUCE HALSTED.

FORMAL THOUGHT THE BASIS OF KENLORE.

EPISTEMOLOGY is one of the most ponderous words in the English language, but it can easily be replaced by the simple Saxon term "kenlore," which describes the process of cognition and would thereby explain how things come within the range of our ken. Our readers will find the term used in Professor Halsted's most interesting article on "The Unverifiable Hypotheses of Science," published in the present number of *The Monist,* where he rightly claims that there are certain hypotheses which "are yet neither confirmed nor refuted by the experiences which we possess or which we can hope to attain." One of them is the parallel postulate on which Eulidean geometry rests, and he is well aware of the fact that there are other geometries based upon other assumptions which are just as "unverifiable and irrefutable," and he calls them "okapi" hypotheses, comparing them to that rare giraffe species called *Ocapia Johnston's Sclater.* Professor Halsted's treatment, based on Poincaré's *Science and Hypothesis,* is quite instructive because he raises an important problem and ventilates it in his own ingenious way. We will add, however, that on several salient points we do not agree with him, and so we will here improve the opportunity of presenting our own views in contrast to his.

The difference between our views and those of Professor Halsted are perhaps insignificant when compared to the agreement between us. Like him we believe "that sci-

ence is to be the light of the world," and it may be that we only explain the facts on which he, together with Professor Poincaré, insists.

Professor Halsted enumerates his unverifiable hypotheses as, "(1) the existence of continuous extensive quanta in nature, (2) the principles of geometry, (3) the principles of mechanics and of the general theory of energy."

Professor Halsted distinguishes between unverifiable hypotheses and the real scientific hypotheses, saying that the former can neither be proved nor refuted while the latter are subject to verification. He overlooks, or at least tacitly passes by, the fact that these so-called unverifiable hypotheses are at the bottom of all scientific thought. They are, what Kant calls transcendental, the condition of cognition itself, and thus enter into every part of the fabric of our thought. For this reason mystics have actually claimed that all knowledge is unverifiable, and what Professor Halsted calls scientific hypotheses, which, he claims, are subject to verification, presuppose that the other more general problems of the unverifiable hypotheses have been settled. They refer to those special problems in which all interest is concentrated on the evaluation of definite facts of experience while the underlying general principles of thinking are taken for granted. Nowhere in our thought can we dispense with the general principles of the formal sciences.

Professor Halsted does not seem to be aware of the fact that all of his so-called unverifiable hypotheses refer to the underlying principles of the formal sciences, and they will be disposed of by a solution of the problem as to the nature of form and formal thought. We have discussed the problem of formal thought repeatedly and will here restate a summary of our solution, which takes a middle ground between the Kantian theory of the *a priori* and experimental sensualism as represented by Locke and his followers,

though we must add that upon the whole we follow Kant more than the sensualists because Kant saw the problem without solving it, while the sensualists attempted a solution without being familiar with the problem itself.

Briefly stated the situation is this. A sentient being becomes acquainted with the objective world through contact with surrounding things. Contact makes impressions which are felt by the senses and in their totality are called experience. The essential part of experience consists of feeling, and if we refer to the feeling alone we speak of it as sense experience but all the several experiences are of different forms, yea the variety of form is the most obtrusive difference by which the various objects are recognized. Every form makes an impression of its own. It makes its own path and is registered somewhere in the cerebral substance. A new impression follows the track into which it fits, and in awakening the memory traces which are like it, it is felt to be the same as they. This is the origin of representative thought, of concepts which have a meaning. In the higher stage of development a thinking being learns to make abstracts. He learns to take notice of qualities, and one of the most important qualities is the quality of form.

The term "form" as here used, implies not only external shape but also internal conformation or structure. It also comprises juxtaposition of parts or interrelations between things, and it is but natural that the highest abstract of this kind results in a conception of pure form, or the mere possibility of interrelations. This condition is produced by abstraction which empties our experience of all sensory elements, leaving only a potentiality for interrelational constructions, a void which in my *Foundations of Geometry* I have called "the field of anyness."

Here lies the foundation of mathematics. The mathematician does not start from nothing but from this void

which has been produced by clearing away all particularity, thus leaving a homogeneous field of universality.

It will be noticed that all the most important axioms of mathematics as well as the main principles of Aristotelian logic are unconsciously derived from this abstract notion of pure form. This void, this field of anyness, has been derived from the facts of experience, but the purely formal sciences are mere mental constructions.

The notion that the mathematician starts from nothing is wrong. The field of his operations, the void, has been abstracted from experience and possesses the potentiality of relationships from which particularities (matter and energy) are rigorously excluded. This confers by indirection definite and positive qualities upon the void, which are homogeneity and universality. This means that a definite construction remains the same wherever and whenever it may be made, and it applies to any possible configuration of the same kind. This quality we have called "anyness," and it is obvious that this anyness of the formal sciences, being due to our own making, can neither be confirmed nor refuted by experience.

Properly speaking anyness is not an hypothesis. It is the result of a mental operation; it is a product of abstraction, and the data from which it has been derived have been furnished us by experience in the broadest sense of the word. Accordingly in one way the purely formal sciences are based upon experience, and in another way they are in the Kantian sense *a priori* constructions.

Experience is of an objective character, and thus the abstraction of pure form is ultimately derived from our notion of the objective world, yet the general idea of pure form furnishes only the condition for the construction of the formal sciences. The real execution of the work is done by operations of the mind and so this part is purely mental or subjective.

The strange thing about our purely formal thought is the fact that no knowledge is possible without it. It is the condition of any knowledge, and this feature of it is called by Kant transcendentalism. As all things are configurations, so the mind itself originates from relational functions by distinguishing between forms, by taking note of interrelations, by classifying types as genera and species, by tracing the interdependence of events, etc., and the principles of all these activities are identical with the principles of formal thought.

From these considerations it appears as a matter of course that being of a purely formal character the general principles of the purely formal sciences are, as Kant rightly recognized, the conditions of all experience, or, to use his term, they are transcendental. They can not be derived from the data furnished by the senses and so they can neither be confirmed nor refuted by experience.

The data of the senses are always particularities, but the fundamental principle of the formal sciences is the idea of universality, which does not exist in the world of concrete things. If we so please we may call the homogeneity of the void an assumption or, with Professor Halsted, an unverifiable hypothesis, but these names convey the idea that the principle of universality, the idea of anyness and whatever may be implied thereby are arbitrary notions, that they are unjustified and unjustifiable, while to any one who has followed our arguments this is obviously far from the mark, and even Professor Halsted grants that they are "not merely arbitrary conventions."

If we bear in mind our solution of the problem of form and formal thought, many difficulties which have puzzled scientists and philosophers and also mathematicians admit of an easy explanation. One of them is the problem of the irrational, another the problem of the infinitely great and the infinitely small, and we will in this connection refer

to our prior article in *The Monist* for January, 1910, on "The Nature of Logical and Mathematical Thought," especially the part written in reply to Prof. Bertrand Russell (pp. 46 ff.).

The objectionable feature of infinitude originates mainly through our neglect to regard mathematical magnitudes as functions. Every number is really the product of a function, and infinitude as well as zero are also numbers. All the zeros and all the infinitudes are not necessarily equal, for their value depends upon the function by which they have been produced. It would be a mistake to regard all infinitudes as the same regardless of their meaning and origin. By an infinitude we understand a function which can never be completed. If we consider infinitudes as objective things that have been completed we become involved in contradictions, by which we will naturally be puzzled, just as is the man who tries to catch his shadow, or the Chinaman who turns around to see his queue. The definition which declares that "an infinite aggregate is one equivalent to a part of itself" is an ingenious paradox, and we regard it as only relatively true. If it were taken seriously it would lead to mysticism.

Whether or not we can call the theorems of the formal sciences "*a priori* necessities" depends entirely upon our definitions both of *a priori* and necessity. If we accept Kant's meaning of those terms, purely formal theorems are certainly *a priori* necessities. Every one, if it has been correctly formulated, is on its own ground necessary. But we have called attention to the fact that there are certain degrees of *a priori*. There is the *a priori*, first, of logical, and then of geometrical constructions. The former is a static *a priori* referring to stationary relations among logical types; it is the *a priori* of being. The latter, a dynamic construction in which the possibility of pure motion is presupposed, is the *a priori* of doing.

The domain of the *a priori* can be more or less rigid, and when we come to the Euclidean system of homoloidal space in which two parallel straight lines will cut only if produced to infinity, we may construct other geometrical systems in which this principle of parallel lines does not hold. They are just as purely mental constructions as is Euclidean geometry, yet besides the giraffe there may also exist an okapi, and when we construct the geometry of the even plane we must grant that there are other geometries possible, such as the geometry of the sphere, of the pseudosphere, of four-dimensional bodies, of curved space, etc. If our systems of purely formal thought are mental constructions, it stands to reason that we ought to be able to create different systems based upon different principles.

We do not deny the possibility of other geometrical constructions than those of Euclid, but we regard them more as evidences of the fact that geometry is a mental construction, than that other assumptions will prove as useful or as applicable to reality. And so it is but natural that these variations have excited the curiosity of only scholarly minds who have little or no interest in practical affairs and delight in the idea that there are vast regions of possibilities which have never been opened up to this commercially minded generation. It can scarcely be denied that the systems of Bolyai and Lobatchevsky command a purely theoretical interest, and that so far as the pragmatic issues of life are concerned they may be regarded as still-born children of the genius of mathematics.

From this standpoint the name "okapi" which Professor Halsted has chosen for these theories seems very appropriate, for the okapi is an animal which is on the verge of extinction. The fate of this animal is tragic, for it has scarcely burst into fame when we know that it will soon disappear again.

For those who are not specialists in zoology, I will say

that the okapi has been known only since 1900. It lives in remote parts of the Congo Free State and being very shy it can be trapped by the natives only in pits. It is practically a stunted giraffe. Its forefeet are shorter and its neck less high than those of its more favored cousins. In place of horns it has mere buttons, and its skeleton most resembles those extinct primitive types of its species which from the places where they have been found, in Hellas and in Samos, have been named Helladotherium and Samotherium. Naturalists have become assured of the existence of this rare animal through its fur and skeleton, because it has been impossible to bring any living specimen within the sight of the white man. The probability is that the okapi will soon join the choir invisible where it will be in the company of the Helladotherium and the Samotherium.

As the okapi is a mere deviation from the giraffe type, so the okapi theories of mathematics are in principle like their better known cousin, Euclidean geometry. They are merely a variety which however proves less fit for survival. The okapi will have disappeared by the time civilization has reached to its present abode.

I learn to my surprise from Professor Halsted that the word "okapi" has only recently been introduced to the English speaking public in the new appendix of the *Century Dictionary,* whereas the continental lexicons have been familiar with it since the appearance of the first travelers' reports about the existence of this strange beast.

It is true enough that "the debate 'what is truth,' is a wrangle unless it give precedence to the kenlore question," but we would deny Professor Halsted's assumption that "we find our knowing is ever subject to our wishing." Reality intrudes upon us and we become acquainted with facts whether or not we wish to have any acquaintance with them, and their nature does not depend upon our desire.

The facts are that the thinking subject, being part of

reality, is in constant interaction with it, and the problem is, how did the thinking subject originate from reality and how is a representation of reality possible in the thinking subject? This, as we have stated, is answered through the formal sciences. The formal sciences are possible because the most significant attribute of reality is form, and having gained a general knowledge of pure form through abstraction from reality, the thinking subject constructs systems of pure form which, when we try to describe reality, can be used as methods of cognition for measuring, counting, and tracing interrelations.

Kant wondered why our notions of pure form should tally with the conditions of the objective world, of nature, of reality; but this fundamental problem of kenlore is solved if we bear in mind that the general notion of pure form has been derived through experience from the objective world.

Formal thought is the origin of cognition and it is applicable to objective existence because form is the essential feature of all things. It is not an accident that the natural laws (e. g., Kepler's and Newton's laws) are summed up in "formulas" and that universals of any kind are best described by the word "uniformities." Science practically consists of classifying forms, of noting interrelations and tracing transformations.

Even the law of the conservation of energy is based upon this same foundation. It is a purely formal statement, for it simply means that nothing originates and nothing is annihilated, all processes of nature are transformations. The law of conservation of matter and energy is as purely *a priori* as the propositions $1 + 0 = 1$ and $1 - 0 = 1$. It can neither be refuted nor proved by experience, because the idea has not been derived from experience but is a product of mental reflection, the result of pure thought.

The same is true of causation which is only the positive

aspect of the law of transformation of which the law of conservation of energy is the negative counterpart. We can trace the concatenation of cause and effect, but we can never prove its universality from experience.

Form is a feature of reality and formal thought originates in thinking beings in response to the actions of the form-conditions of their surroundings with which they become acquainted by experience.

The systematic character of the formal sciences is of our own making, but the conditions of these mental constructions have been quarried out of the mine of experience, and so our conception of form is merely the picture of form in the objective world, as it is mirrored in the human mind.

We conclude this exposition of the part which ideal constructions play in kenlore by an example. We pin a silken thread down in two points and move the point of a pencil at its stretched end. The line resulting from this operation turns out to be an ellipse and ellipses are the paths of the planets. We study the nature of ellipses and formulate the theorems which we learn from the observation of our constructions and when we watch the motions of the planets in the heavens we can by the help of the geometry of ellipses predetermine the progress and all further positions of the planets.

It is a strange fact that these constructions made of ideas of pure form can be so helpful. They serve us as a key to experience, yea these purely formal thoughts are the mentality of our mind. They furnish the method by which sense impressions change into intelligible experience, and the elements from which they grow, being notions of pure form, can not be traced in the sense elements of experience.

The data of sense experience furnish particular facts but not the principle of universality. They are single items, but not the method according to which they appear as instances of general types. They are definite events or concrete

things, not laws, nor norms which would explain why they happen to be such as they are and what they would be like if in one way or another conditions were changed. The latter, laws, principles, methods, are mind-made; the former, the facts of experience, are nature, and nature is a play of transformations.

The laws of pure form are mind-made, but mind in its turn is nature-made. Sentient substance originates and nature impresses its own character into its fabric. There is first a sensing of concrete forms, then a recognition of pure form (that is to say, of form in abstract thought, of form in and by itself) and finally we have the methodical construction of systems of pure form.

The interrelations and interactions of feelings, their formal feature, is what we commonly designate as "mind"; and a systematized conception of them is in a word called "reason." There is no reason, no argumentative faculty such as is human reason, in nature, but there is a formative cosmic order determining all the particular facts of objective existence, and of this cosmic formative order human reason is an echo. From this norm which dominates the world and which is reconstructed in our mind we derive those principles of all our purely formal methods, our principles of logic and logical necessity, of universality, of our fundamental conditions for mathematical thought and geometrical constructions, and here accordingly lies the cornerstone of kenlore.

EDITOR.

CRITICISMS AND DISCUSSIONS.

TRUTH AND NATURE.

I.

Of all the myriad idols which men have shaped them of their imaginings none stands forth so austere, so august, and so transcendently elusive as truth. We are wont to think of the human mind as demanding in the objects of its enthusiasms a certain concrete vividness, sense and emotion wrought upon in unison. And indeed, when we contemplate the long pageant of by-gone worships, we do find therein sensuous color and brilliancy: the pantheons of the nations, the symbols of cult and creed, are the ornate illumination of the scroll of mental history. Nevertheless, upon reflection, we perceive clearly that the showy outward appeals are no real clue to the enthusiasms they arouse. For these appeals are utterly impermanent, pantheon giving way to pantheon, symbol to symbol, with kaleidoscopic ease of mutation; but the motive which yields in turn to the sway of each, the zeal and veneration of the religious spirit, ever remains, unabated and unabashed through all the change. Surely this motive—able to withstand so oft-repeated overthrow of its dearest idols—must spring from an instinct deep-wrought in the human fibre; it must have its source in some perennial prepotency of man's disposition and its final reason in the laws of life and mind—aye, in the very essence of that Nature which has brought into being life and mind.

And obviously there is, through all the change, a constant factor. It is a factor without which the development of a superbrute intelligence must have been forever impossible, for it is the key and support of the building human mind. This factor is belief in truth. And I mean not merely belief in the truth of each seeming revelation as it comes,—not merely sincerity of faith, though this is an evident corollary. But what humanizes intelligence is belief in the worth of truth for its own sake; it is belief in true thinking

as the only possible mental equipment for successful living; and it is such belief as is ready at any time to reject a revelation that fails in the test of experience and to resume a doubting and troubled search for that fond of verity which, however unattained, will yet never suffer denial.

The strength of this belief may be estimated from the devotion inspired by its object. Love of truth is the greatest, as it is the least conscious, of man's passions. Not only is it displayed in just and temperate pursuit of knowledge, but often in blind and bloody defense of errors: for error is simulated truth and is cherished only because it presents itself in truth's guise; heretic and heretic-hunter are alike at least in honest zeal, and in our admiration for the noble courage of a Bruno, preferring death to a stain upon reason, we need not utterly condemn in his opponents the grim determination that their truth must prevail. "The soul," says Plato, "has a faculty of loving truth, and of doing all things for the sake of it." In the history of the world it would be difficult to find any ideal that has profoundly stirred men's minds which has not been regarded as a special and superior manifestation of truth: Crusades, Renaissance, Reformation, Enlightenment, each betokens a new and exalted devotion to belief, and the warring and proselytizing of sects and creeds, in philosophy, science and art as well as religion, are but recurrent testimony to the intensity of earnestness with which men sacrifice and die for their convictions.

Perhaps the extreme type of this devotion is to be found in the characteristically modern pursuit of knowledge for its own sake, in that purely intellectual zeal which is the apotheosis of curiosity. Curiosity is at root a utilitarian affection of mind; for, while it is easy to be perilously interested, on the whole an inquisitive prying into environment is the condition of healthy caution and wise adaptation. In the primitive stages of human history, where experience is all concrete and the problems are immediate needs, acquisition of knowledge is perforce mainly incidental to impulse and appetite. But a purely speculative interest in the "hang" and "go" of things is not tardy in developing: Bushmen paintings are more than highly naturalistic pleasurings of esthetic fancy; they are nature studies in a true modern sense, the product of a lively impersonal interest in environment. Now it is just the mastering of the "hang" and "go" of the world that makes human living so exceptionally efficient; men control nature by finding out her hidden catches and springs; to discover general rules is to capitalize experience and live

on its income, to have reserve funds in time of need. And herein lies the grounding in the laws of life for the development of such a mental trait as curiosity and such a function of mind as precise knowledge.

But the conception of knowledge as a mere instrument, as a condition of biologic well-being tending to preservation and survival, is a late achievement of reflection. It is only in its maturity that reason begins to understand and take into account its own motives and instincts;—indeed, the very essence of "instinct" is "rational impulse" with the "rational" element suppressed in consciousness for the economizing of energy. The instinct of curiosity is no exception. Hardly yet is it emerged from the impulsive stage, and we may view that type of mind in which it is at once most impulsive and most powerfully developed—the scientific mind, the mind eager for knowledge for the sake of knowledge,—as an extreme specialization of mental power for the good of the race: it is to this mind that we owe the profoundly practical and efficient body of knowledge which is coming more and more to guide sane human endeavor and it is from this mind that we derive that degree of supremacy over physical environment which promises to bring mankind to a hale and hearty age. In its elementary phases curiosity is apt to be intensely practical; its concernments are directly at hand; it answers to near needs. But in order that mind might attain a truly generalized dominion, in order that the instrument might be rendered efficient beyond the purview of the individual, so that the system of science should become a racial possession and benefit, it was necessary that there should arise in the individual an instinctive desire for knowledge beyond the scope of apparent utility; theoretic interest had to develop.

Doubtless if we could foresee the whole evolution of our species we should discover that this theoretic interest does as a matter of fact lead to purely practical results, that there is no such thing as useless science, that with race experience as the test the development of knowledge is conditioned by limited and exacting needs. But it is not nature's way to dissipate energies in her chosen tools: impulse sufficient to the deed is all that she vouchsafes; and so we do as a matter of fact find sprung up in the human mind an acute zeal for knowledge apart from any recognized utility, and correlative with this, in the sense of dignity and possession which knowledge gives, an inner sanction satisfying our emotional natures. The man of science may permit the popular journals to exploit the practical benefits of his work (for from showy benefits comes the

popular willingness to support his researches), but inwardly he feels a kind of impatience with such appeal; the utility of his work is felt to be a degradation of the finer sanction, viz., his sense of dignity as an unbiased seeker after truth: in his hierarchy the "pure" sciences are immeasurably exalted above the "applied," and he feels a certain pain when his theoretic investigations result in some practical good. "And the beauty of it, gentlemen, the beauty of it is that it is of no possible use to any one!" was the customary exclamation of a certain mathematician in one of our colleges, when, covered with chalk and beaming with gratification, he emerged from a successful demonstration.

Such is perhaps the ideal specialization of the scientific disposition. But it is contrary to nature (and to definition) that any human being should be an unalloyed scientist: there is always some spark —one might almost say, some saving grace—of human interest in his make-up; a degree of pity is compelled even for Mr. Wells's humorously grotesque Cavor in his last horror at finding his mind giving way at the bare spectacle of the insanely sane Selenites,—and the author does in good sooth show us the *reductio ad impossibile* of the scientific mood in his monstrous lunar ants. A development of this kind is revolting to our every sensibility; and just because it is the inevitable logic of our scientific ideal, it enforces upon us a consciousness of the necessary limitations of that ideal, and its need for supplementation.

As a rule the supplementation comes in the form of some ulterior interest, standing above the concreteness of scientific problems and dominating the whole mental life and attitude. Except in the most intellectual periods of history this interest has been religious—a reliance upon some superhuman humanity capable of justifying every devotion to truth. Such is, above all, the attitude of scholasticism, though it is also a general heritage of our mental history. Science and philosophy, where not consciously practical, are made ancillary to faith; the justification of the ways of God to man is the justification of reason; and a kind of cosmic morality is made the sufficient ground of being. But in certain periods, the great age of Athenian philosophy, the Renaissance, and especially the Nineteenth Century, religion itself has been subjected to the demand for justification; and the conception of Truth has been exalted above that of God or of the Good.

That truth, as a supreme and universal ideal, is capable of inspiring men to a veritable fervor of devotion, is the lesson of many

a biography. There is in its appeal something more than mere intellectual curiosity; there is a sacrificial zeal as well, and often a martyr-like resignation of the dearest of human hopes. A certain abnegation and abasement is characteristic of the modern scientific attitude; it owns a kind of shame for human yearnings and the errancy of a desire-driven soul; it humbles itself before the sense of its own attainment, and seems to derive a melancholy reverence from its contemplation of the majestic indifference of nature; with heroic fortitude it strives to quench every rising flicker of merely human animation, and with stoic pride struggles to convert the mind into an impassive recorder of outward being. Its faith is the most unselfish in the world—or, if it have any match, the cry of Job, "Though He slay me, yet will I trust Him," is its sole parallel.

But the unique and wonderful feature of this devotion is not so much its abnegation of human passion as the tremendous abstractness of its object. What ordinarily moves men's love or reverence is the concrete appeal of material beauty or moral grandeur. Truth, as an ideal, by its nature, of course, possesses neither of these; and although, in most systems of thought, beauty and goodness are made truth's predicates, this is but concession to the humanness of the systems' framers; indeed, it may almost be said that the difficulties of philosophy are but the inherent contradictoriness of this trinitarian dogma of the unity of the true, the good and the beautiful. By itself truth lacks moral and esthetic appeal; and, summing in itself all real and possible knowledge, it lacks, too, any concrete interest. It is, to be sure, derived from a vast number of concrete interests, and undoubtedly the fact that it holds these interests in implicit reference is what gives it its stable hold on men. But these implied interests do not in the least explain the emotional hold of the general conception: their nature, taken severally, is as practical or theoretical problems, deriving whatever penumbrae of emotion they may possess from appetitive need or the instinct of curiosity; and there is no incentive to martyrdom in all this. Even if the nature of the universe be the implied content of truth—as for the enlightened mind it is— there is yet no explanation of the emotional hold of the abstract idea. Men undoubtedly are stirred in imagination by their inner spectacle of the evolving world, but this is obviously an esthetic stimulation; and in any case it cannot account for the sharp summoning of the great idea of which it is but an incidental exposition. For the real cause of devotion to truth and its real

rationale in human nature, we must inquire beyond any mere play of feeling and imagery.

II.

The degree of abstractness wherein the conception of truth is still capable of inspiring devotion, and at the same time the clue to the reason for this devotion, are indicated in the celebrated passage of the Phædrus, where, in the one phrase, Plato describes truth as "colorless, formless, intangible," and yet as "the steersman of the soul." Truth is the "steersman of the soul"; truth is a guide, a director, a ruler of life; truth is the giver of human freedom and a creator of human destinies; truth is at once the expression of man's achievement, and the agent of his efficiency.

It is the tremendous rôle which the thinking of truths has played in the creation of man's humanity, the liberation of psychical life from its lock-step dependence upon the whip and spur of ever-varying sensation, it is this deed which has inwrought in man's mind his instinctive veneration for the ideal of knowledge. Truth is the steersman of the soul, and in a very near sense; for the body of our knowledge is the chart whereby we direct the course of life, and so determine the soul's development.

The emergence of a human from the multitude of brute species is the most wonderful fact of biological history; and the wonder of it lies almost solely in the appearance of that power of thought, the power of forming generalizations, general conceptions, which is distinctive of man. Man's humanness rests its case on the fact of his human mind. What is above all peculiar to that mind is its foresight; its faculty of abstracting the fixed and constant elements from the general evanescence of experience, and, by service of such abstractions, its power to predict the future. Prediction, foresight, enables preparation, preparation makes possible the realization of ideals.

To be sure in the lower animals, nature to a degree makes good the lack of rational foresight. Instinct is her agency, and in general we may say that, in the long development of mind, consciousness acquires stability and efficiency in two modes or forms, instinct and conception. Both of these come as generalizations of race experience, enforced and ingrained by the harsh contacts of unyielding environments, and both are means of surmounting the transiency of the moment-to-moment life. Instinct is the more primitive and essential. It is also the more narrow, condensed and specialized

Bound close to the preservative and perpetuative activities, and so restricted by the peculiar forms and needs of the organism, it lacks adaptability and elasticity. Nevertheless, it represents a vast advance over the fickleness of consciousness confined to fleeting sensation and whim. An instinct is a kind of universal; it is a sign of a recurrent experience, its relative simplicity representing the multitude of details which the repetitions embrace. It is a race generalization, fixed only after myriad efforts and at a cost of myriad failures, and already it reveals glimmerings of prevision: the honey-maker stakes present toil for future joyance, the sentinel of the herd exchanges present gratification for future safety.

Instinct, then, evinces two of the characteristics of conception, universality and prevision. But it lacks the characteristic which must be added to make reason possible, mobility, the power to form varied and new combinations to suit varied and new situations. It lacks, in short, the power to represent the novel and to create the ideal. It is anchored so snugly to the concrete case that abstraction is impossible, and without abstraction there can be no freedom, no ideality.

Thus, the hugeness of the gap separating man as the reasoning animal from the rest of brute creation is warranted by the nature of reason itself; for between instinct and reason is all the difference between blindness and seeing, between servile subjection to ephemeral events and spiritual freedom in the realm of ideas. It is the nature of conception to represent to the mind that which is not present in sense; it is the nature of reason to combine conceptions to likenesses and uses not yet realized in experience. In this nature of reason is founded human freedom,—first realized in that mastery over nature which has enabled man to conquer the antagonisms of physical circumstance and adapt, not himself to environment, but environment to his own need and profit, so that he, alone of animals, is immutably himself in whatever zone or clime.

But of vastly more consequence than this physical mastery, is the spiritual independence which reason wins for him. The sole instrument and enablement of reason is the conception or idea. Reality is fixed in the matrix of time, forming an unalterably concrete series of haps and events no one of which may beg or borrow added period; gone, each is gone forever. But it is not so with ideas. It is their character and essence to bridge and conquer time. Their truth is the experience of yesterday and the prophecy of to-morrow. They serve, indeed, to create yesterday and to-morrow, for it is by

dint of ideas alone that the reach of life is expanded beyond the mere immediacy of appetitive existence. Abstracting from the passing flow of events what is typically and reiterantly significant, they lock these significances together in the form of universals, which are the counters of intellectual life and the foundation of all intelligent experience. Valid yesterday, to-day, and to-morrow, universal ideas form the truth,—the talisman opening the portals of all knowledge and giving consistency and worth to all enduring personality. Nor has the human mind been dull to their meaning, but from the very first it has beheld in them its divinities.

III.

The human mind has evolved. It has not sprung in fullness of strength and glory from the being of creative nature. Only through long generations, the long years of man's history and the vastly longer ages of his prehistory, has it gradually and painfully come to its own. The motive of this evolution is significant of the final meaning of intelligence. As we survey the mind's growth, we see that the process has been one of slow breaking away from the thralldom of sense.

To think—to form abstractions, to classify facts, to organize knowledge—is no light or easy achievement. The animal mind, even at its highest, in the apes, we believe to be absolutely dependent upon the sensations and perceptions of the moment. There may be animals capable of a very dim foresight, but at the best their reach of thought cannot extend beyond a few hours' duration, and the content of their thought can never transcend the particular. It is the perception or feeling of the moment, in all its concrete vividness, that absorbs consciousness; the present hunger or the present grateful satiety, the present bodily zest or the present drowsiness, these are meter and guide of the conscious life.

Now the primitive human mind—at its lowest—is advanced far beyond this stage. There are no men incapable of thinking the lapse of days and nights with the concurrent duration of things—no men, perhaps incapable of thinking time in those greater measures set by the phases of the moon or the annual recurrence of the seasons. And these standards, be it noted, are objective; they are no mere appetitive change, but observed alternations in nature. Further, they are observed as recurrences—the terms day, night, moon, winter, mean not merely the experience of light and hunger of this day, the gloom and drowsiness of this night, the waning of this moon, the dolor of

this season of snow, but they mean the constantly repeated like experiences in a man's life, days and winters past and to be. In other words, they are terms expressive of generalizations; they are terms by means of which man universalizes his knowledge; they are mental signs of truths of experience.

The progress of the human mind in its slow emancipation from the domination of sense is conspicuously shown in the emergence, in the history of thought, of the great principles of reason. At the very basis of nature's intelligibility lies the principle known to logic as the principle of identity. On this is based all our classificatory science, all our generalizations, all our abstract thinking, in fact all of that system which we interject into reality by means of language; for every word, every name, denotes some special aspect of nature, which is subject to repetition. It is because two things or events are alike that we are able to designate them by the one word. Similarities, likenesses, are the keys to our intellectual mastery of what Kant calls the "blind play," the "rhapsody," of undifferentiated sensation.

Now similarity or likeness is purely an ideal relation. It pertains to an apprehending mind, not to the bare fact of reality. Similarity implies an act of comparison, a measurement of one thing against another; an act which can be function of mind only. There are no likenesses in nature; likeness is not a quality of a thing or things, but a relation, established by mind, between things. And recognition of likenesses, identities, is the first great step to the conceptual mastery of nature. It is the beginning of the formation of that map, that mental diagram or scheme of things, which constitutes our notion of the world, and so constitutes our ideal of truth.

What it cost the human mind to attain this power of generalization through observation of similarities, is impressively shown by the long and painful mental effort through which freedom in the world of ideas has been won. Through many, many generations, through many, many centuries, man thought, as most men still think, only in concrete images. Myth, fable, allegory, were the normal and necessary vehicles of abstract ideas. A new abstraction formed, wrought as on an anvil in the white heat of experience, glowed with the hue and flare of embodied life, and so was heralded to the mind as a new deity in its great pantheon of ideas. The count of every primitive religion reveals its quota of hypostatized ideas: the Hindu *Dharma,* the divine Law, comparable to the *Logos* of Greek and Christian thought; the Greek *Charis, Themis, Nemesis;*

the Roman *Justitia, Fides, Bellona*; the Norse *Frith* and *Blith*. Most of these originated as attributes of some more primitive deity—a nature deity, as these are deities of society—the attribute being first personified as a special incarnation of this deity, and then, thanks to the mental clutch which personification gives, thrown off as independent members of the divine council. Thus *Zeus* is father of *Dike*, Justice; *Athena Nikephoros*, the bearer of victory, is transformed into *Nike*, the Winged Victory herself.

But the nature gods themselves illustrate the same development. They merely belong to an earlier stratum of abstractive thought. Zeus is the shining heavens, summarizing the light and orderliness of the world above; Demeter is the earth beneath, and Kore, her daughter, is the symbol of the vegetation of recurring years. These gods are abstractions of man's experience of elemental nature, forged as it were, by nature herself in his growing mind, to enable him to overleap the narrow boundaries of the moment and master days and seasons to come.

It is many generations beyond the mythic stage of thought—a stage we have not yet wholly outgrown—that the thinkers of our race begin to realize the true meaning of abstract thinking: how it is the functional rather than the material element that is significant for human life; that truth is measured by the mastery of natural destiny which truth yields.

The primitive organization of nature under mythic forms gives place to the conception of a universe governed by law and order. But what is this law and order? In reality, it is only a new mythology, a new truth. It serves our purpose better than the old; its basis is a greater range and duration of human experience. But its basis is nevertheless nought but human experience, and human experience taken in its unreal, in its ideal, intention. Scientific law is scientific truth. This is not to say that it is fact. It is a certain statement of fact,—fact generalized. It has correspondence with fact. But the correspondence is relative to signification, to the respect in which the facts are considered, hence to human intelligence and purpose.

Let us briefly consider this relationship of truth and fact.

We cannot ask of a fact if it be true, when we mean by "fact" the actual flow of phenomena in world history; a fact cannot be other than status or locus in the general course of events; fact is reality itself; and it would be meaningless to speak of reality as true or false. But ideas symbolize facts, and according as that symbolism is efficient or inefficient, we term them true or false. To be sure,

ideas may exist as psychical events without being either true or false; they may be neutral so long as they are not predicated of anything; but this is considering them apart from a thinking process, and it is doubtful if any idea is ever entertained apart from some possible judgment. And the faintest suggestion of use in judgment is a degree of truth-error already entered into the idea. An idea which is a possibility is tinged with truth; it points to some reality of which it is the truth and it begins to shape itself to the system or context in which that reality is conceived.

Manifestly, the only employment of ideas is as truth or falsehood; they are suggested predicates or they are mental lumber. But this is not saying that there is but one species of truth or falsehood open to them. As a matter of fact, there are myriad such; as many as we have worlds abuilding,—and the ordinary mind has a considerable number of these worlds, each formed of a group of concepts united by some center of interest, to some particular purpose,—and each, at least ostensibly, unrelated to its mates. Thus, we have the world of reality in numerous fairly disjunct aspects: as a world of every-day contacts, the limited one-man reality; as a world of social ideals, the communal world; as a world of beauty and ugliness; as a world of philosophical or scientific speculation, a cosmos; and we have besides as many fictive or romantic worlds as there are fictions or romances. The same ideas are judged true or false in these various worlds only in analogous senses; and as each world has its own governing conception, ideas enter in or are rejected in utterly different proportion. In each case the candidate for truth-positing is tested for its ability to fit into and bind together the general system of which it is to form a part, and while it necessarily modifies the conceptual whole to some extent, it is itself reacted upon by the sheers and strains of the total structure.

The scientific world of law and order no less than the mythic world of the wills of the gods is thus a creation of a point of view; it is a regard in which things are considered. As a system it stands out against nature, as a sort of key to nature; and it is by no means, as we are too wont to think, embodied in the being of reality. There is a great fission between thought and things, the one having its order in a hierarchy of ideal relationships, the other in the historic flow of events known to us only in sense-perception.

IV.

Perhaps I can bring home this ideal and relative character of scientific truth by illustration.

An interesting instance of that broadening of human powers of conception which I have been stating, centers about the notion of ether. The idea of ether doubtless originates with the mythic conception of the blue sky as the abode or embodiment of divinity,—"Zeus is Aether," says Æschylus. And thence it passed into science through Aristotle's notion of it as the substance of the higher empyrean, the realm of stars.

But its significance for modern physics dates mainly from the objection of Leibnitz to Newton's theory of gravitation, that action at a distance is impossible and inconceivable. To meet the objection, ether, or an etheric fluid, was postulated as a medium for action by contact, that is, as a medium for the conveyance of gravitational forces. To-day the reverse of Leibnitz's view is the more tenable. Lotze has shown that action by contact is, if anything, less conceivable than action at a distance, and indeed action at a distance is essential to the conception of force itself, and of gravitation. For gravitation is nothing more than the expression of a relation between two bodies separated in space. Simply stated, it is the rule that the acceleration of each of the bodies is proportional to the mass of the other, while the attractive force or tendency is inversely as the square of the distance. The word "force," as applied to gravitation, means only a tendency to motion of a certain sort under certain conditions; and it is affirmed that this is universal. But under certain ideal conditions it could not be universal. For the force of gravitation is purely an attractive force, that is it is a tendency of motion of bodies toward one another. Now if it be conceived that this force is the only one in existence and further that it is operative only in the particles (mere centers of this force) composing the earth, then there would be one irresistible and ever accelerating tendency of all these particles toward the earth's center of gravity, involving the ultimate shrinking of the globe to a mere punctual nothingness. The same mishap would occur, under like supposition, to a finite universe.

Of course such a *reductio ad absurdum* of gravitation is too far from the facts of reality to be more than idle speculation; there are repulsions as well as attractions to be taken into account; but at least it serves to emphasize the fact that human theories are built upon too narrow a range of phenomena, hold true of too limited a sphere of reality, to serve as a foundation for the prediction of cosmic destinies. Even in our own solar system it is not certain that gravitational attraction does not exceed the ratio expressed by the law, though by an infinitesimal fraction, as the sun is neared.

In emphasizing the limitation of scientific theory, scientific achievement is in no wise being brought into question. What is essential to be understood is that scientific thought is to-day in rapid evolution and that scientific knowledge is at best only an account of restricted fields of reality. A generation ago Mill held that the whole inquiry of natural science is for causes of phenomena; to-day physicists assert that the notion of cause has no place in their science at least. Time, space, mass are the categories under which physical phenomena may be conceived. Is it for a moment to be supposed that these can give an adequate account of this rich and varied world in which we dwell? The whole region of growth, vitality, consciousness, the visible, tangible, audible dimensions of creation, are yet to be taken into account.

For a quarter of a century philosophers have been examining and analyzing scientific conceptions with an assiduousness and interest proportional to the immense significance of their metaphysical bearings. The result of this investigation has been singularly unanimous. The body of scientific law is conceded to be a powerful instrument of knowledge, a veritable calculus of reality, but in no sense a photographic reproduction of reality; it is a mnemonic device for the assemblage of facts useful or calculable; it is not a narrative of creation. In consequence of this view, materialism,—the conception of the universe as an atomistic machine,—has been utterly discarded. It answers not the least demands of reason, accounts not for the most potent facts. In its place, idealism, in some form or other, holds general sway; and it is safe to assert that the doctrine of evolution with its attendant theories, has served no end more certainly than that of compelling the philosophic conclusion that purposive intelligence is the chief fact, the *Leitmotiv* of the universe.

Of course the philosopher, too, frames his opinion upon the meager basis of human experience. There is a temerity periling effrontery in any effort to infer the whence and whither of the cosmos from a span of experience at its utmost covering less than ten thousand recorded years, and in its free intelligence only a fraction of that time. But the philosopher at least has in his favor that he judges in accordance with instincts to which nature has indubitably given rise; he recognizes and considers those human values which for us are alone significant.

V.

Protagoras began his treatise on truth, "Man is the measure of all things." The history of the growth of knowledge since his day

only emphasizes the certainty of this aphorism. Our measure of the world is human science, and the measure of science is human intelligence,—in last resort the power of imagination. For imagination is not alone the solace of life; it is also, and above all else, the faculty which has lifted man above the time-serving brute, making possible his insight into the natural history of what lies behind the screen of sensation. Imagination is the power whereby we discover truth; it is the instrument by means of which we rear the wonderful structure of human knowledge, our parable of reality. Its potency measures possible science; its flexibility determines mental evolution. According to Herbert Spencer, conceivability, or as he puts it, the inconceivableness of the negative, is our final criterion of truth. Upon the mind's power to abstract and relate phenomena science is dependent, and with this power science is limited. John Stuart Mill, in comment, pointed out that human power of conception is not a static thing, that it expands from generation to generation,—the antipodes, inconceivable in the fifteenth century, are accepted as commonplace in the sixteenth,—and by reason of this expansion, continually broadens the mind's horizon, continually throws back the borderline of possibility. On the one hand is human impotence, the mind's abashment in the presence of the unknown, but on the other there is an energy of growth ever straining the leash of mortal circumstance.

"Man is the measure of all things." But man's is a changing, a growing nature. Ever he seeks to project this nature out into the cosmos which environs him, and ever he finds the cosmos growing with his own inner growth. The system of the sciences is continually enlarging and must continue to enlarge so long as there is growth of intelligence. The system of the sciences is our truth. And this is, of course, to say that truth is ever changing, ever growing. Truth is relative to human insight. It is nothing fixed in the being of the world of fact; it is only that ideal of this world which mind has found useful to mind's purpose.

And from this point of view we are warranted in criticising the conception of nature which commonly goes under the name of materialism or of mechanism,—the view, often called the scientific view of things, which asserts that our earth and our solar system are but a phase in the evolution of some primordial cloud of star dust, due in the tale of the ages to become star dust once again. From nebulae worlds are generated to be resolved once more to nebulae after running their course. Man's life is but an incident of this cosmic

process, it is meaninglessly generated to be as meaninglessly snuffed out; and the sole rôle of human intelligence is to evolve a knowledge of the uselessness and hopelessness of human life, while the acme of human dignity lies in the attainment of a sort of melancholy satisfaction in reviewing the grim spectacle of the cosmic æons.

It has ever been the cue of those who see in the cosmos a colossal machine grinding slow fatalities, to bid man to realization of his own weak, paltry, and precarious being; he is summoned to consider himself the helpless factotum of vain and foolish destinies in whose whim he must humbly acquiesce. This is but a new species of anthropomorphism,—man worshiping the shadow of his blinder self; for the conception thus raised up as the august antipode of human frailty is still a creation of the human mind, a part of the proper furniture of that conscious being which is summoned to abashment.

The conception of the life of the universe as consisting of cycles of blind evolutions followed by blind destructions is not a new conception. It is older than the despair of Buddha, and if in no just sense ascribable to Heraclitus, it is not to be distinguished from the conception which lay at the basis of the ascetic abnegation of the Stoics or that which issued in Proclus's ghastly theory of world degeneration. It *may* be that the conception is true. But the "may be," let it be understood, is merely an acknowledgment of human fallibility. It means only that our finite knowledge is incapable of conclusively gainsaying any possibility; it does not mean that the theory itself is, humanly speaking, probable or plausible.

For we must remember our premises. Truth is not the gist of reality, but our scheme of it, measured by our intelligence; and our nature and intelligence is ever-growing. If we know anything in this world it is the fact of growth—the fact of ever-receding limits to knowledge — the fact of never-ending imaginative conquests. Growth of mind is growth of imagination; growth of imagination is continuation of our mental conquest and absorption of nature. There is no ultimate or absolute truth so long as life is, nor is any final pronouncement of man's destiny possible so long as man is engaged in making his place in the world.

It is not unnatural, then, if we feel a certain grotesqueness in the contention of those whose business it is to be seers of truth, that, with the bourne of their imaginations reached, the fullness of human knowledge is in sight. To be sure, we concede a limit at which each individual imagination must balk further progress; but

that limit attained, it is not the part of an oft-vaunted scientific humility to challenge future insight. It is as were the imagination to come saying: "I am old. I am weak and worn. I can see no more. But I have conceived and brought forth my thought, the satiate truth. Beyond there is nothing."

It is little wonder that such a view should have led, through the contrariety of despair, to Nietzsche's barbaric laudation of man as the "great blond beast" overriding natural destinies. But it is wonder that it could ever so appeal to human rationality as to blind men to the evidences of intelligence in the world. Our own reason is an instance of this intelligence, and we are at least parcel of nature. Nor is there any contradiction of science in making,—nor any warrant of science which opposes,—the assertion of higher intelligence than ours in the universe, battling, with us, against night and chaos.

Furthermore, even in the mechanistic view of nature, there is an invariable, if often unwitting, insistence upon the human factor—the man-value of truth. In itself mechanism is the most monstrous of idolatries. It outrages every sentiment of the soul, every principle of the reason (though this is not saying that it may yet not be fact; if the world be chaos, reason is chaotic with the rest). In order to redeem it, the mechanist seeks to furbish it up with some aspect of human significance. The best of his conception is a sort of Overman,—one who has extinguished all the warmth of human feeling and desire, and in place of a destiny answering man's natural needs has set the chill ideal of impassive Intellect. But this, too, is human. *Man* after all is the measure; he alone is the unit of worth—he, the weak sport and victim of the colossal nightmare! If there are meanings, they are meanings for the human soul; if there are truths, they are truths of human destiny; if any value is, it is the creation of human experience. The intellectual value that is recognized is a product of dissection and mutilation—self-dissection, self-mutilation—but it is none the less part and parcel of man's being. The naive openness of the confession shows the faith of the mechanist the more appalling. One sees him precarious on the verge of realization; one trembles for the revelation that may shatter his trust. Helpless in the coils of his belief, already he begins to feel dimly the horror of it, the horror he has never dared to front, face to face. With the desperate old instincts of his soul he clutches still the humanhood for which his creed has no place, attesting still the

supreme worth of that spirit his philosophy must deny. Man, though mere mortality, about to die, he salutes.

VI.

Perhaps the wisest of the ancient sayings concerning truth is Plutarch's, "Truth is a striving after divinity." In what has preceded I have endeavored to show that truth belongs to the world of ideas and ideal relations—of human ideas, human thought.

But there is another world of Ideas—Plato's world of divine Ideas, the model and archetype of the visible universe. Human ideas, according to Plato, and human works, and indeed all the works of visible nature, are but imitations of these divine archetypes. They are but expressions of that dumb striving of all imperfect being after perfect being which Plato found to be motive alike of the history of mankind and the history of changing nature.

Nowadays we give Plato's thought a new interpretation. In the light of the doctrine of evolution we are once again brought face to face with a scheme of nature the motive of which is the striving of an imperfect after a perfect being. Through the long ages of geologic time we see species and genera and orders of life, at first embryonic in form, affording only a faint premonition of their eventual type, proceeding by devious and laborious paths to this type's realization. A striking example of this is shown in the development of that one of the orders of the mollusk class—the Cephalopoda, now only represented by the "many-chambered nautilus." Beginning far back in paleozoic times with genera of the type of the Orthoceras, preserved to us in the form of simple conical shells compartmentally divided, this branch developed through the ages; first, slightly curved forms; and then the more and more tightly coiled varieties with ever-increasing complexity of structure, which culminates in the Ammonites—coil contiguous upon coil. It was as if, through all those millions of years, nature had held before herself this ideal of beauty, to be consummated only through infinite experiment, infinite endeavor, infinite striving. Thus the wonder of the Ammonite is a part of the meaning of the Orthoceras, though the realization of this meaning was to be bought at a price of æons. So it is with every natural type. It is contained implicitly in its dim precursors, but only the long years can bring nature's thought to the surface.

Does not this mean intelligence, reason, plan in the universe? A truth like our truth in being ideal, in existing for the future toward

which like ours, it is ever reaching out? It means this, or our own truth is illusion.

And the human mind,—the human mind is itself a product of this striving growth. It is itself a part of the divine plan contained in that world of ideas, which forecasts evolutions. We as human animals are creatures of this creative nature.

Only—and here is the great fact—the end of our development is not its material form. Nature has not exhausted her gift to man in the creation of his body,—his physical vital history. She has given him mind. And it is the great function of mind to win for us freedom from the flux and flow of merely physical destinies. In attaining the ideal the mind becomes emancipated from the perishable world of things; it wins its freedom, as Spinoza puts it, in the world of ideas. Truth, then—our human truth, relative, mutable, ever imperfect, ever-growing,—is the means and symbol of the deliverance of the soul from merely mortal destinies. It is not for what truth pictures to us—the world idea it generates from generation to generation—that it has meaning, but for what truth does for us, that freeing of the spirit which can come only with ideals that lift us above the chance and circumstance of material time. "Truth is a striving after divinity"—that divinity which from the first man has found only in the world of his ideals.

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PRAGMATIC REALISM.

There has been a great deal of confusion in regard to terms in recent discussion. It may be well, therefore, to define, at the outset, what we mean by realism. A number of writers have called themselves realists and proposed to champion realism, when they are really indistinguishable from idealists. Here, at least, the Leibnitzian law of indiscernibles ought to hold. If the terms realism and idealism are retained at all, they ought to stand for different concepts. It is hard to see how theories which strive to express reality in terms of a series of perspicuous or translucent states of consciousness can be called realism. This would surely make the shade of Berkeley wince. Leaving out all reference to the metaphysical stuff for the time being, realism means the reference to an object existing beyond the apperceptive unity of momentary individual consciousness, and that this object can make a difference to

that consciousness so as to be known. The object, in other words, is dependent upon the cognitive moment not for its existence, but for its significance. Idealism, on the other hand, would hold that there is strictly only one unity of consciousness and that existence is a function of being part of a significant system. Thought is so wedded to things that things cannot exist without being thought. This assumption on the part of idealism may be veiled under various terms, such as appearance and reality, the finite and the infinite, the incomplete purpose and the completely fulfilled purpose; but in the various forms of expression the assumption remains that all the facts are ultimately and really strung on one unity of thought.

To avoid uncanny metaphysical associations it may be well to point out that realism is an epistemological attitude and has to do with the relation of the cognitive meaning to its object. As regards stuff it may be materialistic, spiritualistic or dualistic, though to-day it is more likely to be spiritualistic. As regards connection it may hold the mechanical interpretation as regards the relation of parts; or it may hold the teleological point of view; or partly one, partly the other, which is the position common sense realism takes. As regards the numerical distinctness of the universe, it may be monistic, holding the universe to be one individual with only apparent diversity in space and time; or it may be frankly pluralistic, holding to the numerical diversity and distinctness of individuals. As realism, therefore, is pledged to no brand of metaphysics, no odium need attach to it so far as metaphysics is concerned.

Realism, as I understand it, does not assume that there can exist isolated or independent individuals of such a kind as to make no difference to other individuals. No individual has any properties, chemical any more than psychological, by itself. Qualities are reactions or expectancies within determinate contexts. An isolated individual cannot even be zero, as zero must be part of a logical context at least. The hypothesis of independent reals is founded either on contradictory or on purely hypothetical conditions. Kant's things by themselves are instances of the latter kind. These cannot exist for experience or in relation to things as known. Yet they are supposed to be possible for an intuition entirely different from ours. Leibnitz has recourse in the last analysis to an emanation theory and preestablished harmony, which contradict his assumed independence. Cognitively independent his monads could not be in any case, since by implication they are aware of each other.

Realism does not deny that objects to be known must make a

difference to reflective experience; that they must be capable of being taken in a cognitive context. To deny this, within the universe of truth, would be self-contradictory. What realism insists is that objects can also exist and must exist in a context of their own, whether past or present—independent of the cognitive subject; that they can make differences within non-cognitive contexts, independent of the cognitive experience, which the latter *a posteriori* must take account of. Thus the wood in the grate burns, even though we are not taking account of it; the seed grows when we are asleep, through properties involved in its chemical context. Even our own meanings grow without our being reflectively aware of their change.

As our own cognitive meanings are necessarily finite and any other type of knowing is necessarily hypothetical, it is difficult to see how any theory of knowledge can avoid being realistic. Absolute idealism, with its hypothetical unity; and mysticism, with its ineffable noëtic intoxication, still must admit that the finite meaning, in striving for its completion, implies an object beyond its internal intent. To deny this is to fall into solipsism or to confuse oneself with the absolute. The complete absolute meaning cannot be said to depend for its existence upon our finite fragmentary insight. And it is with that finite intent that our problem of knowledge is concerned.

In order to clear the way for realism, we must get rid of some fundamental fallacies which permeate most of our past philosophic thought. One of these fallacies may be stated as the assumption that only like can make a difference to like, or that cause and effect must be identical. This has been assumed as an axiom by idealism and materialism alike. For idealism and materialism are alike indiscriminative. Their method is dogmatic rather than critical. The only difference is in the stuff with which they start. Idealism, starting with meaning stuff, tries to express the whole universe in terms of this. Materialism, starting with mechanical stuff—stuff indifferent to meaning and value—must be consistent, or as consistent as it can, in expressing the universe in terms of this. Both buy simplicity at the expense of facts.

The problem is the old one of Empedocles: Can only like make a difference to like? "For it is with earth that we see Earth, and water with Water, by air we see bright Air, by fire destroying Fire. By love do we see Love, and Hate by grievous hate." Expressed in terms of modern idealism, from the side of individual consciousness, the problem would read: Can only experience make a differ-

ence to experience; can only thought make a difference to thought? The absolute idealist attempts this disjunction: The reality which we strive to know must either be part of one context with our own finite meaning, must be included within the completed purpose, the absolute experience, of which we are even now conscious, as well as of our finitude and fragmentariness; or, on the other hand, the real object must be independent of our thought reference, must exist wholly outside our cognitive context, without being capable of making any difference to it. But complete independence is meaningless; therefore there must be one inclusive experience. To think an object is to think it as experienced, therefore it must be experience.

The issue at this point between the realist and the idealist is a twofold one. The realist insists that there can be different universes of experience which can make a difference to each other; and also that what is non-reflective or non-meaning can make a difference to our reflective purposes, or *vice versa*. We can reflect upon a stone; that makes the stone experience *for us*. But does it also make the stone *as such* experience? It is as reasonable, at any rate, to say that only water can know water, and that therefore in order to know water we must have water in the eye or in the brain, as it is to say that in order to know the stone or to reflect upon the stone, the stone must be reflective. In either case our attitude is merely dogmatic. That objects in order to be known must be capable of being taken again in the context of cognitive experience is, of course, a truism. But that does not prove that they cannot exist without being known or that they must be experience in order to be known.

Science has been forced to abandon the axiom that only like can act upon like. It is busy remaking its mechanical models in order to meet the complexity of its world. Chemical energy need not be the same as electrical or nervous energy to make a difference to either. Chemical energy implies weight and mass, while electrical or nervous energy does not. The old metaphysical difficulty in regard to conscious and physical energy has given way to a question of fact. The question is not, *Can* they make a difference to each other? but, Is there evidence of their making any difference to each other? A cup of coffee or a good beefsteak makes a difference to thinking. But that does not necessarily make them thought stuff. Whether cause and effect are identical, either in kind or in time, is something for empirical investigation to determine, and not to be settled *a priori*. Science presents strong evidence that they need be neither. The light rays may have traveled through space many

years before they make the difference of light sensations in connection with our psychophysical organism.

It is time that philosophy, too, were abandoning dogmatism in favor of facts. It is no longer a question of materialism or idealism; but we must use idealistic tools where we are dealing with idealistic stuff and mechanical categories where the evidence for consciousness and value is lacking. We must learn to respect ends where there are ends; and to use as means those facts which have no meaning of their own. To fail thus to discriminate is to be a sentimentalist, on the one hand, or a bore, on the other. What we want is a grain of sanity, even the size of a mustard seed.

The merit of idealism, and for this we ought to give it due credit, is that it has shown that the universe must be differentiated with reference to our purposive attitudes. This is true whether the reality to be known is purposive or not. Where idealism has been strong is in interpreting institutional life. In order adequately to know another meaning, we must copy or share that meaning. This is true whenever our reality is thought stuff. Idealism, on the other hand, has always been weak in dealing with nature, and, therefore, in furnishing the proper setting for natural science. Idealism has striven to institutionalize nature or to reduce nature to reflective experience. In order to do this, it has been forced either to insist upon the phenomenality of nature, with Berkeley and Green, or to take the ground of Hegel, John Caird, and Royce, that nature is essentially thought, social experience, the objectification of logical categories, though *an sich* and not *für sich*, i. e., as lived over by reflective experience. Hence nature becomes capable of system; it is essentially systematic. In thus apotheosizing the unity of apperception into an objective unity of nature, idealism has failed to discriminate. The stone and Hamlet are lumped together. But we cannot acknowledge or react on nature as reflective or as experience on its own account, and therefore idealism breaks down. We make the *conceptual system* of nature, as social minds, to anticipate the future and to satisfy our needs. The meaning of the energy that satisfies and of the transformations by which it satisfies is furnished by our subjective context. Water satisfies thirst. That is an extra-subjective energetic relation. But the why must be furnished by our imperfect context of scientific experience. Our knowledge of nature, we must confess, is partial and selective. Not completeness, but control, is what we must aim at. Knowledge is good here when it works. It does not exhaust the manifoldness of nature.

Materialism has been quite right in applying the mechanical categories to part of reality. The mechanical ideals will always find favor in natural science, where the aim is not the understanding of an objective meaning, but control of nature for our purposes. Where the materialist shows his dogmatism is in applying categories which are convenient in dealing with the non-purposive structure of the world to institutional reality as well. In failing to make them work here, instead of calling into play new categories, he insists upon eliminating the refractory world of meaning and value, while the idealist, with his eye primarily on the world of social tissue or ideals, has insisted that the real is essentially the social or communicable. Each has failed to recognize how the other half lives.

Another dogmatic fallacy which has been committed by idealists, to smooth out the realistic discontinuities and ease the shock of actualities, is the play upon the implicit and explicit. I would not say that the category of the implicit has no legitimate use. Wherever we are dealing with a purposive whole of any kind, intellectual, ethical or esthetic, we not only can but must use the category of the implicit. The earlier part of the argument must imply or foreshadow the later within the logical unity. The earlier part of the dramatic plot must find its fulfilment in the later; the moral struggle points to an ideal. The abuse of the category of the implicit comes when we apply our purposes to infra-purposive realities. Because thinking as a process arises under certain structural conditions of complexity, this does not prove that earlier and simpler stages must be treated as degrees of thinking. There seem, on the contrary, to be qualitative leaps in the genetic series of experience, not reducible to the quantitative category of degrees. Thinking is a new fact in the series—furnishes a new context of significance. Again, because we systematize nature according to the presuppositions of the reflective moment, this does not imply a reflective unity in nature. Here again there seems to be a discontinuity, so far as meaning is concerned, which thought must acknowledge and cannot bridge, objectively at any rate, by any implicit assumption as regards thought's own procedure.

Another current dogmatic fallacy is the assumption that because we take contents over in thinking them, therefore we transmute or make them over, if indeed we do not create them outright, in taking account of them. But the transmutation of the immediate or non-reflective has to do with its significance, not its content. The colors in the painting are the same that we have seen thousands

of times, though here they are used to express a new meaning. The gold we think about has precisely the same qualities as the gold which was present as an object of immediate perception or esthetic admiration. It does not change its color or size because we reflect on it. It is the same object with the same qualities and relations, i. e., if we conceive it truly, except that much of the existential has been omitted and the relation of cognitive significance has been superadded.

Another fallacy is the assumption that what is not stuff cannot be real. This assumption is very old. It is assumed by Parmenides when he dismisses non-being as unthinkable and unspeakable. It is assumed by Kant in his antimony of space and time, when he maintains that the relation to nothing is no relation. Most philosophers have followed the leadership of these distinguished thinkers. But the assumption that zero is unthinkable and that the relation to nothing is no relation has been abandoned by mathematics for logical reasons. There is no more important relation in number than the relation to zero. The limiting concept of zero has also proved of great value in metaphysics as well as in mathematics. Take space for example: While space is no *thing*, yet as distance it is an important condition in the interaction of things.

Instead of the dogmatic method pursued by the old idealism and materialism alike, we must substitute scientific method. This method has been rechristened within recent years by C. S. Peirce and William James and called pragmatism. As I understand this method it means simply to carry the scientific spirit into metaphysics. It means the willingness to acknowledge reality for what it is; what it is always meaning for us, what difference it makes to our reflective purposes. Instead of insisting upon identity of stuff, as dogmatism has always done, this method is discriminative. It enables us to break up the universe and to deal with it piecemeal, to recognize unity where there is unity and chaos where there is chaos, purpose where there is purpose and the absence of purpose where there is no evidence of purpose. The universe in each part or stage of development is what we must acknowledge it to be, not necessarily what we *do* acknowledge, but what we *must* acknowledge to live life successfully. This acknowledgment, moreover, is not a mere will to believe or volitional fiat, but, at least as knowledge becomes organized, a definite and conscious acknowledgment. An unlimited will to believe as regards objective reality would be possible, if at all, only before we have organized knowledge, that is, if you could

imagine knowledge starting in a conscious will-act. When we already have organized knowledge, if we choose to know, the possibilities become limited. In case of fully organized knowledge the place of the indeterminate will to believe would be the will not to think, that is, to commit intellectual suicide.

Neither can we state the truth attitude in merely subjective terms. The truth attitude must face outward. It must orient us to a context existing on its own account, whether past or present. In such orientation or such external meaning lies the significance of truth. The truth attitude cannot be characterized as merely doubt with a transition to a new equilibrium, and as ceasing with certainty. The truth attitude *may* at least involve the consciousness that we know that we know. To be sure, the nervousness of science leads us to repeat the experiment, in order to make sure that we have made no mistake; but that does not alter the truth of our first finding, if the experiment proves correct. Truth, as we have it, involves two things,—first, luminousness, or a peculiar satisfaction to the individual experience at the time, due to its felt consistency or fluent termination in its intended object. This is the positive truth value, whether formal or factual. The other factor involved in scientific truth is the feeling of tentativeness or openness to correction. This is a qualification or nervousness on the part of the truth attitude either as a result of an actual feeling of discrepancy and fragmentariness as regards our present meaning; or it may be due to a more general feeling of instability based upon our finitude and the time character of our meanings. Such correction can only come through further experience, whether of the immediate or formal type. We cannot say that the value *consists* in the future consequences or leadings. These obviously have no value until they come. Further experience furnishes the possibility of correction of our truth values and so of producing new values. I say *possibility* of correction because repeating the experiment, while it relieves our nervousness, does not necessarily produce a new truth. The truth meaning must first be stated in schematic terms on the basis of the data as we have them and then tried out in terms of consequences. If the truth value lay merely in the consequences or leadings there could be no such thing as truth value. Truth must face backward in order to face forward. It is Janus faced.

We may lay it down, then, that the real must be known through our purposive attitudes or conceptual construction. Real objects are never constituted by mere sense perception. They are not com-

pounds of sensations. Sensations are our awareness of the going on of certain physiological changes, whether connected with an extra-organic world or not. They cannot be said, therefore, to constitute things. These presuppose selective purpose. They can only become objects for a self-realizing will. The real is the intelligible or noumenal, not the mere immediate; and by the noumenal I mean what we must meet, what reality must be taken as in our procedure, as opposed to our sensations. It is through conative purpose that knowledge of the character of our world becomes possible. The immediate, however, must furnish the evidence; in the language of Professor James it puts us next to the real object, it establishes energetic continuity with the intended context of reality.

Empiricism, therefore, is at best a half-way house. We cannot say that the real is merely what *is* perceived or what *makes* an immediate difference to our conscious purposes, whether in the way of value or of fact. We must at least say that the real is what *can* be perceived, unless we bring in some *deus ex machina* or supernatural storehouse of percepts, as Berkeley does. Surely the empirical idealist of to-day would not say that the increased powers of the telescope or microscope create the facts. Nor can the uniformity of our expectancies be credited to our individual perception, and, hence, from the perceptualist point of view, requires another *deus ex machina*. To say that uniformity or stability is a social fact does not explain the fact, but presupposes an extra-social constitution, a constitution binding upon all of us. Not only perception, but *possible* perception, must be invoked to complete the empirical idealist's reality; and "possible" itself is not a category of perception.

As the old idealist and the old realist alike assumed the qualitative identity of cause and effect, it became necessary to think of subjective states as copies of external qualities. Naive realism and idealism alike assume this copy-relation of the subjective on one hand and the real qualities on the other. In modified realism, the primary qualities at least must be copied. For the empirical idealism of to-day the problem still remains as to whether the perceptions and the objective qualities are the same. Unless the idealist becomes a solipsist he must show that his subjective copies are adequate to a world as existent. This difficulty would vanish, once we abandoned the dogmatic and unintelligible duplication of qualities, as though qualities could exist passively by themselves. Qualities are energies. They are what objects must be taken as in determinate contexts. To ask what perceptual qualities are, when

they are not perceived, becomes in that case as superfluous as it is meaningless. Processes, of which we are not conscious, have no perceptual qualities, unless, under certain other conditions, they can make perceptual differences to beings organized as we are. To speak of archetypal qualities is merely duplicating this moment of perception —to take what exists in a context as an abstract idea. If these non-conscious reals act upon other non-conscious reals, we have not perceptual differences, but chemical or physical changes. These must be interpolated by us in order to make continuous our perceptual scheme. We saw the wood burning in the grate: in our absence the fire has gone out and the wood has turned to ashes. To piece together this discontinuity in our perceptions we must assume certain differences or changes which cannot themselves be expressed as perceptions. And thus we come to realize that while we must take some qualities of things as existing as part of our perceptual context, we must also take other qualities as existing independent of perception in their own dynamic thing-contexts, which we can read off *a posteriori* and predict under determinate conditions.

Even granting a being, therefore, who should have perceptual differences for all the changes going on, minute or great, and without breach of continuity, even he would not have a complete account of reality. The real individual cannot be exhausted as a compound of perceptual qualities. He must be acknowledged as something more than the sum total of his sense appearances, past, present and future. If sensations alone constituted reality, then the more sensations the more reality. Take Helen Keller's reality, for example, on this supposition. For convenience, I will use Professor Titchener's estimate of the number and kinds of sensations. According to him, sight furnishes us 32,820 different sensations, hearing 11,600, making a total of 44,420. As Helen Keller possesses neither the sense of sight nor that of hearing, her reality would be to our reality as 15 is to 44,435. But Helen Keller seems to be able to enter into communion with human beings all over the world, to share their purposes, to sympathize with them and help them better than most human beings with the use of all their senses. The reason the position that reality is the sum of its perceptions, has seemed so plausible lies partly in the fallacious use of the method of agreement, partly in the confusion between the *causa cognoscendi* and the *causa essendi*. The perceptual qualities do exist; and it is through them we become immediately conscious of an external world. Objects are

what they are perceived as, but indefinitely more. We must not forget that there are other contexts, such as the multitudinous thing-contexts and the contexts of our will attitudes. These may be practically more significant for determining the reality of a thing than our sensations—not all of which can be treated as sense qualities. It may be of more practical significance for the nature of water that it satisfies thirst than that it gives us a number of contact reactions. When we come to deal with a human being, a friend of ours, the inadequacy of mere perceptual qualities becomes even more evident. He is not to be taken merely as his height, nor his color, nor his softness, nor his hardness, nor even the sum total of all the perceptions we can get. He is primarily what we must acknowledge, what fulfills a unique purpose on the part of our wills, and, as opposed to the gold or the stone, a reality with an inner meaning which we can to some extent copy.

We have seen that experience becomes truth only through conceptual construction or purposive will attitudes. Percepts only become cognitively significant as termini of ideal construction, as verification stuff. No wonder that the perceptualists have not been able to discover non-being dimensions, since these could not be perceived, but discovered only through the most subtle conceptual tools, according to the real difference which they make to our purposive striving. We have already indicated that because reality can only be known conceptually, that does not mean that reality must be conceptual. Reality is, however, only knowable in so far as it is conceptualized. In recognizing that reality could not be treated altogether as purpose, moral or intellectual, Kant showed a keenness far exceeding that of his critics, as he showed his obtuseness in not recognizing that purpose, as expressed in individual and institutional life, is a real part of reality.

Since perceptual qualities are the felt continuities or functional connections of energetic centers, when a conscious agent is part of the complex, there can be no sense in speaking of these qualities as either acting upon the will or parallel to the world of will-acts. The perceptual qualities do not exist independent of the concrete situation, so that they could act upon it. They are what the object must be taken as, or known as, *in* the special psychophysical context. They preexist only potentially, i. e., as what the object can be taken as in the determinate context. They are, however, only one type of transient connections or energetic continuities. These energetic continuities may be intersubjective relations, and in that case com-

munication and conceptual understanding are possible. They may be relations to centers below the reflective level. In that case knowledge becomes instrumental—a reweaving of a non-meaning context into the unity of our purposes.

Equipped with our subjective purposes, or conceptual tools, we can confront the larger world. In the course of conscious experience, as we strive to realize our tendencies, formal or parctical, the world beyond us becomes differentiated and labeled according to our success or failure. But the real objects are not constituted by our differentiation, except when we make our realities outright, as in the case of artistic creation. The meaning for us is, indeed, created in the course of experience, but not the objects which we mean. Else science were impossible. The real objects must be acknowledged or met, whether they are to be understood or to be controlled.

The world of real objects may be differentiated into two general divisions, the world of being or stuff, on the one hand, and the world of non-being or non-stuff, on the other. By the former I understand various types of expectancy or uniformity, which we can have in regard to our perceptual world. These types of uniformity, again, can be graded into two main divisions, namely, those which we can acknowledge metaphysically as purposive in their own right and those we must acknowledge as existing and must meet, but which have no inwardness or value on their own account. The former we must learn to understand and appreciate, the latter to anticipate and control. The former constitute the realm of idealism, the latter of materialism. Whether our conceptual structures should be regarded as copies or as tools with reference to the larger world is not a question that can be settled after the manner of *either or,* but must depend upon the kind of reality we mean. If this reality is that of other purposive structures or meanings, then the relation must be that of copying or sharing; if the reality aimed at is infra-reflective, then the relation must be instrumental. As regards the stuff character of reality our theory is frankly pluralistic, acknowledging different kinds and grades of energetic centers according to the differences they make to our reflective purposes.

But we must also take account of the non-stuff dimensions of reality. These differ from the stuff types in that they are not perceptually continuous with our psychophysical organism. They cannot appear as immediate phenomena, but still must be acknowledged for the realization of our purposes. Thus we must ackowledge the transformation of our values, the instability of our meanings. *Time*

creeps into our equations and makes revision necessary. New values can only be had by waiting. Again, *space*, as distance, abstracting from the content of space, conditions our intersubjective relations, as well as our relations to non-purposive beings. It makes possible externality of energetic centers and free mobility. Further, the relativity of our meanings and ideals makes necessary the assumption of an absolute *direction*, a normative limit, to measure the validity of our finite standards. Lastly, we find it convenient to abstract the fact of *consciousness* from the changing contents and the conative attitudes. While our awareness is intermittent, the conative attitudes and purposes may be comparatively constant. These non-stuff dimensions must be regarded as real as the will centers which they condition. They are more knowable than the world of stuff, because their characters are few and simple, whereas the varieties and contexts of stuff are almost infinite. Thus, by means of our conceptual tools, we are able to discover not only various kinds of stuff, but we are able to discover dimensions of reality of ultimate importance, where microscopes and telescopes cannot penetrate—realities which eye hath not seen nor ear heard, nor ever will see or hear, more subtle than ether or radium, if these be more than fictions.

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EDITORIAL COMMENT.

Prof. John E. Boodin will be remembered by the readers of *The Monist* for his article on "Philosophic Tolerance" (April, 1908) in which he supported the pragmatism of Professor James. At that time the editor asked him to make a reply to the comments on his views in the editorial article on "Pragmatism" which appeared in the following issue. Professor Boodin has not made use of the invitation, but prefers to offer to the readers of *The Monist* an exposition of his views without reference to the controversy in question.

In the present article Professor Boodin makes the following statement: "Instead of the dogmatic method pursued by the old idealism and materialism alike, we must substitute scientific method. This method has been rechristened within recent years by C. S. Peirce and William James and called pragmatism."

If pragmatism avowedly accepts the scientific method, would it not be better to call it the "Philosophy of Science"? Nevertheless,

so far as we understand the movement, pragmatism does not credit science with the ability to build up a philosophy. To pragmatists the will to believe and the personal equation are more important than the assured results of scientific inquiry while science is criticised for the instability of its doctrines.

We do not believe that C. S. Peirce and Prof. William James can be lumped together as if their pragmatism were one and the same. Each of them has his own preferences but both are very different. Mr. Peirce is strong in logic and truly scientific in his work, while William James is very original and ingenious. But if pragmatism, as commonly understood, were truly nothing but another name for "scientific method," it would not have anything new to offer, and there would be no need of starting life over again; it would have been sufficient to continue the work of science and apply its methods more and more thoroughly in all fields, especially in the department of philosophy.

ON POINCARE'S "MATHEMATICAL CREATION."[1]

M. Poincaré's essay on mathematical invention which appeared in the July *Monist,* is of supreme interest for the psychologist. It offers a valuable contribution to the psychology of genius, at the same time relegating "unconscious cerebration," the importance of which has been somewhat exaggerated, to the place it ought to occupy.

Why are so few men capable of mathematical creation or even of comprehending mathematics? M. Poincaré, I believe, gives the best reason when he attributes this impotence not only to an insufficient strength of memory and attention, but even and especially to the absence of a special intuition, of a proper feeling for mathematical questions.

A mathematical demonstration in fact, as he rightly says, is not a simple juxtaposition of syllogisms, but a succession of syllogisms placed "in a certain order"—an order which the true mathematician feels directly so that he perceives as "a whole" the course of reasoning which supports it.

In my opinion a secondary difficulty upon which Poincaré has nothing to say and of which he has perhaps failed to take note, lies in the use of symbols. This difficulty (and we may note in passing that scientific symbols are usually repugnant to artists, especially

[1] Translated from the French by Lydia G. Robinson.

to painters) generally appears whenever we depart from the concrete, or rather from a presentation which is familiar to us, to pass to one which is less, or not at all, familiar. Thus certain people have trouble in relating the true geography of a country to its representation on a map. Such again in other respects is the case of the musician who does not compose without resorting to his instrument, even when the written notes arouse the sounds in his ear.[2]

It is not by accident that I refer to this instance. Mathematics and music are closely comparable, however different the two studies may be in other respects. Both require aptitudes above all which are most definite and most easily recognizable. And let no one think that the talent of the musician rests only in the quality of his hear! The musical faculty, no less than the mathematical, requires a special intuition. An intrinsic logic regulates invention in music, and consequently its comprehension, as well as in the most abstruse calculus. Like the mathematician the composer[3] chooses from among themes offered to him those that are productive, that is to say susceptible of development. There are ideas or themes which lead to nothing; and the developments of a fertile idea not only obey known rules, but there must be a particular sense, a direct spontaneous understanding of the logic according to which they are arranged.

Let us now come to the part played in invention by the unconscious or the subconscious.

The period of unconsciousness does not indicate simply a rest, a recuperation of cerebral energy. It performs work; but what work? That is the question. It is not purely automatic since there is a choice. Is it then the unconscious which makes the choice and which thus becomes more clear sighted than the conscious? Poincaré refuses to believe so. The performance of actual work, he says, must precede the mysterious operation of the subconscious, and this very operation can be completed only in a fully conscious state. How then shall we explain the choice? According to him the results produced by the subconscious or subliminal will be those which interest the sensibility, like the esthetic sense of the mathematician; only those proposed combinations which satisfy his esthetic sense (and this indeed is very important in mathematics[4]) will pass

[2] See my "Observation sur une musicienne" in *Revue philosophique*, Sept. 1903, and *Art et psychologie individuelle* (Paris, F. Alcan, 1906).

[3] I mean especially the composer of symphonies. Dramatic music is "modulated" not "developed."

[4] In chess a bad play gives an unpleasant appearance to the chess board.

through the sieve of unconsciousness. But there is always a succession of voluntary efforts which has put the whole machine into motion and offers favorable combinations.

The eminent geometrician is entirely right, and I can not protest too strongly against the tendency of certain psychologists to exaggerate the rôle of the unconscious after it had been too much neglected. Distrust of our reason must not lead us to yield everything to instinct; nor the scorn of clear thought, to imagine any sort of obscure intelligence.

It is now many years since I myself pointed out "the positive orientation which serves as a good preparation for our system of images,"[5] and noted that this orientation presupposed a "choice."[6] I was speaking of the work of the artist and poet, but are there not the closest relations between our most widely diversified modes of creation?

Have we not all observed also what happens when we have left a task in what I shall call a state of confusion (*embrouillement*)? When we resume it we no doubt gain by the comparative rest accorded our nervous cells, but only the salient ideas, the principal points of view have survived and have taken their rank in the confused mass of our thoughts. The task already begun has been continued in our mind; a sort of purification has taken place and one last effort is enough to bring it to the point. So, borrowing M. Poincaré's comparison, the gaseous atoms put in motion by preliminary effort continue their dance after our will no longer has control, but in the direction in which it has impelled them.

If we mean that work is accomplished without us, at least it has always been prepared by us. There is a clear state of consciousness in the finishing as well as at the start.

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FOUR-FOLD MAGICS.

Having read Professor Kingery's interesting article in the April *Monist*, entitled "Magic in the Fourth Dimension," I wish

but in a case of this kind visual attractiveness is affected, if I may say so, by intellectual attractiveness.

[5] *Memoire et imagination*, p. 134.

[6] *Art et psychol. indiv.*, p. 122.

to make some comments which may be of general interest.[1] In my opinion his treatment does not clearly argue out the analogy, with the result that none of his productions can be considered as a four-fold magic.

A magic square has two magic directions parallel to its sides through any cell—a row and a column; a magic cube has three magic directions parallel to its edges, a row, a column and a "line," the latter being measured at right angles to the paper-plane. By analogy, if for no other reason, a magic 4-fold should have four magic directions parallel to its linear edges, a row, a column, a line, and an "*i*." [The i is a convenient abbreviation for the imaginary direction, after the symbol $i = \sqrt{-1}$.] It is quite easy to determine by analogy how the imaginary direction is to be taken. If we look at a cube, set out as so many square sections on a plane, we see that the directions we have chosen to call rows and columns are shown in the square sections, and the third direction along a line is found by taking any cell in the first square plate, the similarly situated cell in the second plate, then that in the third and so on. In an octrahedroid the rows, columns and lines are given by the several cubical sections, viewed as solids, while the fourth or imaginary direction is found by starting at any cell in the first cube, passing to the corresponding cell of the second cube, then to that of the third, and so on. If we examine Professor Kingery's examples, we see that only his octahedroids of orders $4n$, i. e., 4^4, 8^4, are magic in the imaginary direction.

If we denote each of the nine subsidiaries of order 3 in Fig. 1 by the number in its central cell, and take the three squares 45, 1, 77, in that order, to form the plates of a first cube; 73, 41, 9 to form a second cube, and 5, 81, 37 for a third cube, we get an associated octahedroid, which is magic along the four directions parallel to its edges and on its 8 central hyperdiagonals. Comparing the above figure with Professor Kingery's Fig. 1, which is only "semi-nasik," we find the magic sum on 9 rows, 9 columns and 18 diagonals, the nine subsidiaries equally weighted and magic in rows and columns,

[1] The subject has been treated before in:

Frost (A. H.), "The Properties of Nasik Cubes," *Quarterly Journal of Mathematics*, London, 1878, p. 93.

"C. P." (C. Planck), "Magic Squares, Cubes, etc.," *The English Mechanic*, London, March 16, 1888.

Arnoux (Gabriel), *Arithmétique graphique*, Paris, 1894, Gauthier-Villars et Fils.

Planck (C.), *The Theory of Path Nasiks*, 1905. Printed for private circulation. There are copies at the British Museum, the Bodleian, Oxford, and the University Library, Cambridge.

and further the square is 9-ply, that is the nine numbers in *any* square section of order 3 give the magic sum of the great square.

It will be convenient here to turn aside and examine the evolution of the nasik idea and the general analogy between the figures of various dimensions in order that we may determine how the nasik concept ought to be expanded when we apply it in the higher dimensions. This method of treatment is suggested by Professor Kingery's remark, p. 310, "It is not easy—perhaps it is not possible—to make an absolutely perfect cube of 3." If we insist on magic central diagonals we know that, in the restricted sense, there is only one magic square of order 3, but if we reckon reflections and reversions as different there are 8. If we insist on magic central great diagonals in the cube, as by analogy we ought to do, then, in the restricted sense, there are just 4 magic cubes of order 3. But each of these can be placed on any one of six bases and then viewed from any one of four sides, and each view thus obtained can be duplicated by reflection. In the extended sense, therefore, there are 192 magic cubes of order 3. None of these, however, has the least claim to be considered "perfect." This last term has been used with several different meanings by various writers on the subject. From the present writer's point of view the nasik idea, as presently to be developed, ought to stand pre-eminent; next in importance comes the ply property, then the adornment of magic subsidiaries, with the properties of association, bent diagonals of Franklin, etc., etc., taking subordinate places.

65	6	52	29	78	16	20	42	61
36	73	14	27	37	59	72	1	50
22	44	57	67	8	48	31	80	12
69	7	47	33	79	11	24	43	56
28	77	18	19	41	63	64	5	54
26	39	58	71	3	49	35	75	13
70	2	51	34	74	15	25	38	60
32	81	10	23	45	55	68	9	46
21	40	62	66	4	53	30	76	17

Fig. 1.

The lattice idea certainly goes back to prehistoric time, and what we now call the rows and columns of a rectangular lattice first appealed to man because they disclose contiguous rectilinear series of cells, that is sets of cells, whose centers are in a straight line, and each of which has linear contact with the next. It must soon have been noticed that two other series exist in every square, which fulfil the same conditions, only now the contact is punctate instead of linear. They are what we call the central diagonals. It was not until the congruent nature of the problem was realized that it became apparent that a square lattice has as many diagonals as rows and columns together. Yet the ancient Hindus certainly recognized this congruent feature. The eccentric diagonals have been called "broken diagonals," but they are really not broken if we remember that we tacitly assume all space of the dimensions under consideration saturated with contiguous replicas of the figure before us, cells similarly situated in the several replicas being considered identical. A. H. Frost[2] nearly 50 years ago invented the term "nasik" to embrace that species of square which shows magic summations on all its contiguous rectilinear series of cells, and later extended the idea by analogy to cubes,[3] and with less success to a figure in four dimensions. If the nasik criterion be applied to 3-dimensional magics what does it require? We must have 3 magic directions through any cell parallel to the edges, (planar contact), 6 such directions in the diagonals of square sections parallel to the faces (linear contact), and 4 directions parallel to the great diagonals of the cube (point contact), a total of 13 magic directions through every cell. It has long been known that the smallest square which can be nasik is of order 4, or if the square is to be associated, (that is with every pair of complementary numbers occupying cells which are equally displaced from the center of the figure in opposite directions), then the smallest nasik order is 5. Frost stated definitely[4] that in the case of a cube the smallest nasik order is 9; Arnôt[5] was of opinion that it would be 8, though he failed to construct such a magic. It is only quite recently[6] that the present writer has shown

[2] *Quarterly Journal of Mathematics*, London, 1865, and 1878, pp. 34 and 93.

[3] The idea of the crude magic cube is, of course, much older: Fermat gives a 4^3 in his letter to Mersenne of the 1st of April, 1640. *Œuvres de Fermat*, Vol. II, p. 191.

[4] *Quarterly Journal*, Vol. XV, p. 110.

[5] *Arithmétique graphique*, Paris, 1894, p. 140.

[6] *Theory of Path Nasiks*, 1905.

that the smallest nasik order in k dimensions is always 2^k, (or 2^k+1 if we require association).

It is not difficult to perceive that if we push the nasik analogy to higher dimensions the number of magic directions through any cell of a k-fold must be $\frac{1}{2}(3^k-1)$, for we require magic directions from every cell through each cell of the surrounding little k-fold of order 3. In a 4-fold nasik, therefore, there are 40 contiguous rectilinear summations through any cell. But how are we to determine these 40 directions and what names are we to assign to the magic figures in the 4th and higher dimensions? By far the best nomenclature for the latter purpose is that invented by Stringham,[1] who called the regular m-dimensional figure, which has n $(m-1)$-dimensional boundaries, an m-fold n-hedroid. Thus the square is a 2-fold tetrahedroid (tetragon), the cube a 3-fold hexahedroid (hexahedron); then come the 4-fold octahedroid, the 5-fold decahedroid, and so on. Of course the 2-fold octahedroid is the plane octagon, the 3-fold tetrahedroid the solid tetrahedron; but since the regular figure in k dimensions which is analogous to the square and cube has always $2k$ $(k-1)$-dimensional boundaries—is in fact a k-fold $2k$-hedroid—the terms octahedroid, decahedroid, etc., as applied to magics, are without ambiguity, and may be appropriately used for magics in 4, 5, etc. dimensions, while retaining the familiar "square," "cube," for the lower dimensions.

To obtain a complete knowledge of these figures, requires a study of analytical geometry of the 4th and higher dimensions, but, by analogy, on first principles, we can obtain sufficient for our purpose. If we had only a linear one-dimensional space at command we could represent a square of order n in two ways, ("aspects"), either by laying the n rows, in order, along our linear dimension, or by dealing similarly with the n columns. In the first aspect, by rows, the cells which form any column cannot appear as contiguous, though they actually are so when we represent the figure as a square on a plane. Similarly we can represent a cube on a plane in three aspects. Suppose the paper-plane is placed vertically before us and the cube is represented by n squares on that plane (P-plane aspect). We get a second aspect by taking, in order, the first column of each square to form the first square of the new aspect, all the second columns, in order, to form the second square of the new aspect, and so on (V-plane aspect). We obtain a third aspect by dealing similarly with the rows (H-plane aspect). Here the "lines," which

[1] *American Journal of Mathematics*, Vol. III, 1880.

appear as contiguous cells in the V- or H-plane aspects do not so appear in the P-plane aspect, though they actually are contiguous when we examine the cube as a solid in three dimensions. Now consider an octahedroid represented by n cubes in a space of three dimensions. We get a second aspect by taking the n anterior, vertical square plates of each cube, in order, to form a first new cube; the

34	74	15	65	6	52	24	43	56
23	45	55	36	73	14	64	5	54
66	4	53	22	44	57	35	75	13
20	42	61	33	79	11	70	2	51
72	1	50	19	41	63	32	81	10
31	80	12	71	3	49	21	40	62
69	7	47	25	38	60	29	78	16
28	77	18	68	9	46	27	37	59
26	39	58	30	76	17	67	8	48

Fig. 2. P_1- and P_2-aspects.

69	20	34	7	42	74	47	61	15
28	72	23	77	1	45	18	50	55
26	31	66	39	80	4	58	12	53
25	33	65	38	79	6	60	11	52
68	19	36	9	41	73	46	63	14
30	71	22	76	3	44	17	49	57
29	70	24	78	2	43	16	51	56
27	32	64	37	81	5	59	10	54
67	21	35	8	40	75	48	62	13

Fig 3. V-aspect.

69	7	47	28	77	18	26	39	58
20	42	61	72	1	50	31	80	12
34	74	15	23	45	55	66	4	53
25	38	60	68	9	46	30	76	17
33	79	11	19	41	63	71	3	49
65	6	52	36	73	14	22	44	57
29	78	16	27	37	59	67	8	48
70	2	51	32	81	10	21	40	62
24	43	56	64	5	54	35	75	13

Fig. 4. H-aspect.

n plates immediately behind the anterior plate in each cube to form a second new cube, and so on. Evidently we obtain a third aspect, in like manner, by slicing each cube into vertical, antero-posterior plates, and a fourth aspect by using the horizontal plates. Carrying on the same reasoning, it becomes clear that we can represent a k-fold of order n, in k—1 dimensions, by n (k—1)-folds, in k dif-

ferent aspects. Thus we can represent a 5-fold decahedroid of order n, in 4-dimensional space, by n 4-fold octahedroids, and this in 5 different ways or aspects.

Return now to Fig. 1 and the rule which follows it, for forming from it the magic octahedroid of order 3. If we decide to represent the three cubic sections of the octahedroid by successive columns of squares we get Fig. 2.

If we obtain a second aspect by using the square plates of the paper-plane, as explained above, we find that this is equivalent to taking the successive rows of squares from Fig. 2 to form our three cubes, instead of taking the columns of squares. Thus the presentation plane shows two different aspects of an octahedroid; this is due to the fact that the fourth dimension is the square of the second. We may call these aspects P_1- and P_2-aspects. The aspect obtained by using antero-posterior vertical planes is shown in Fig. 3, that from horizontal planes in Fig. 4. We may call these the V- and H-aspects. If we use the rows of squares in Figs. 3 or 4 we get correct representations of the octahedroid, but these are not new aspects, they are merely repetitions of P_1, for they give new views of the same three cubes as shown in P_1. In the same way, if we turned all the P-plane plates of a cube upside down we should not call that a new aspect of the cube. The aspects P_2, V, H can be obtained from P_1 by turning the octahedroid as a whole in 4-dimensional space, just as the V-plane and H-plane aspects of a cube can be obtained from the P-plane aspect by turning the cube in 3-dimensional space. Fig. 4, above, is Fig. 2 turned through a right angle about the plane of xy; we can turn about a plane in 4 dimensions just as we turn about a straight line in 3 dimensions or about a point in 2 dimensions. It will be noticed that in the four aspects each of the 4 directions parallel to an edge becomes in turn imaginary, so that it cannot be made to appear as a series of contiguous cells in 3-dimensional space; yet if we had a 4-dimensional space at command, these four directions could all be made to appear as series of contiguous cells. There is one point, however, which must not be overlooked. When we represent a cube as so many squares, the rows and columns appear as little squares having linear contact, but actually, in the cube, the cells are all cubelets having planar contact. Similarly, in an octahedroid represented as so many cubes the rows and columns appear as cubelets having planar contact, but in the octa-

hedroid the cells are really little octahedroids having solid, 3-dimensional contact.

When we examine the above octahedroid (Figs. 2-4) in all its aspects we see that there are through every cell 4 different directions parallel to the edges, 12 directions parallel to the diagonals of the square faces, and 16 directions parallel to the great diagonals of the several cubical sections. There remain for consideration the hyperdiagonals, which bear to the octahedroid the same relation that the great diagonals bear to a cube. If we represent a cube by squares on a plane we can obtain the great diagonals by starting at any corner cell of an outside plate, then passing to the next cell of the corresponding diagonal of the succeeding plate, and so on. Similarly we obtain the hyperdiagonals of the octahedroid by starting from any corner cell of an outside cube, passing to the next cell on the corresponding great diagonal of the succeeding cube, and so on. Evidently there are 8 central hyperdiagonals, for we can start at any one of the 8 corners of one outside cube and end at the opposite corner of the other outside cube. There are therefore, through any cell, 8 different directions parallel to the central hyperdiagonals. With the directions already enumerated this makes a total of 40 directions through each cell and agrees with the result already stated.[8] Evidently the number of k-dimensional diagonals of a k-fold is 2^{k-1}, and if the analogy with the magic square is to be carried through then all the central k-dimensional diagonals of a k-fold ought always to be magic. It is here that Professor Kingery's 4^4 and 8^4 fail; they are not magic on their central hyperdiagonals.

The smallest octahedroid which can have all these 40 directions magic is 16^4, and the writer has given one of the 256 square plates of this magic and a general formula by which the number occupying any specified cell can be determined. But it will be interesting to determine how nearly we can approach this ideal in the lower orders. The octahedroid of order 3 can be but crude, and practically Fig. 2 cannot be improved upon. All rows, columns, lines, and "i"s are magic, and likewise the 8 central hyper-diagonals. Of course, since the figure is associated, all central rectilinear paths are magic, but

[8] If we call the diagonals in square sections parallel to faces 2-dimensional, those parallel to the great diagonals of cubical sections 3-dimensional, etc., etc., then the number of m-dimensional diagonals of a k-fold is $2^{m-1}k!/m!(k-m)!$ In fact the number required is the $(m+1)$th term of the expansion of $\frac{1}{2}(1+2)^k$. It will be noticed that this reckons rows, columns etc. as "diagonals of one dimension."

this is of little account and other asymmetrical magic diagonal summations are purely accidental and therefore negligible.

Turning to the next odd order, 5: Professor Kingery's Fig. 2 is not a magic octahedroid as it stands, but a magic can be obtained from it by taking the diagonals of subsidiary squares to form the 5 cubes. Denoting each subsidiary by the number in its central cell, we may use 602, 41, 210, etc. for the first cube; 291, 460 etc. for

495	58	271	589	152	478	66	259	597	165	436	54	267	585	173	499	62	255	593	156	482	75	263	576	169
178	391	84	297	615	186	379	92	285	623	199	387	80	293	606	182	400	88	276	619	195	383	96	289	602
511	204	417	110	323	524	212	405	118	306	507	225	413	101	319	520	208	421	114	302	503	216	409	122	315
349	537	230	443	6	332	550	238	426	19	345	533	246	439	2	328	541	234	447	15	336	529	242	435	23
32	375	563	126	469	45	358	571	139	452	28	366	559	147	465	36	354	567	135	473	49	362	555	143	456
70	258	596	164	477	53	266	584	172	490	61	254	592	160	498	74	262	580	168	481	57	275	588	151	494
378	91	284	622	190	386	79	292	610	198	399	87	280	618	181	382	100	288	601	194	395	83	296	614	177
211	404	117	310	523	224	412	105	318	506	207	425	113	301	519	220	408	121	314	502	203	416	109	322	515
549	237	430	18	331	532	250	438	1	344	545	233	446	14	327	528	241	434	22	340	536	229	442	10	348
357	575	138	451	44	370	558	146	464	27	353	566	134	472	40	361	554	142	460	48	374	562	130	468	31
270	583	171	489	52	253	591	159	497	65	261	579	167	485	73	274	587	155	493	56	257	600	163	476	69
78	291	609	197	390	86	279	617	185	398	99	287	605	193	381	82	300	613	176	394	95	283	621	189	377
411	104	317	510	223	424	112	305	518	206	407	125	313	501	219	420	108	321	514	202	403	116	309	522	215
249	437	5	343	531	232	450	13	326	544	245	433	21	339	527	228	441	9	347	540	236	429	17	335	548
557	150	463	26	369	570	133	471	39	352	553	141	459	47	365	561	129	467	35	373	574	137	455	43	356
595	158	496	64	252	578	166	484	72	265	586	154	492	60	273	599	162	480	68	256	582	175	488	51	269
278	616	184	397	90	286	604	192	385	98	299	612	180	393	81	282	625	188	376	94	295	608	196	389	77
111	304	517	210	423	124	312	505	218	406	107	325	513	201	419	120	308	521	214	402	103	316	509	222	415
449	12	330	543	231	432	25	338	526	244	445	8	346	539	227	428	16	334	547	240	436	4	342	535	248
132	475	38	351	569	145	458	46	364	552	128	466	34	372	565	136	454	42	360	573	149	462	30	368	556
170	483	71	264	577	153	491	59	272	590	161	479	67	260	598	174	487	55	268	581	157	500	63	251	594
603	191	384	97	290	611	179	392	85	298	624	187	380	93	281	607	200	388	76	294	620	183	396	89	277
311	504	217	410	123	324	512	205	418	106	307	525	213	401	119	320	508	221	414	102	303	516	209	422	115
24	337	530	243	431	7	350	538	226	444	20	333	546	239	427	3	341	534	247	440	11	329	542	235	448
457	50	363	551	144	470	33	371	564	127	453	41	359	572	140	461	29	367	560	148	474	37	355	568	131

Fig. 5.

the second cube; 85, 149, etc. for the middle cube, etc., etc. But few of the plane diagonals through any cell of this octahedroid are magic. In fact no octahedroid of lower order than 8 can have all its plain diagonals magic; but by sacrificing this property we can obtain a 5^4 with many more magic properties than the above.

In Fig. 5 the great square is magic, nasik and 25-ply: the 25 subsidiaries are purposely not nasik, but they are all magic in rows

and columns. If we take up the subsidiaries in the way just described, viz., 513, 221, etc., for the first cube; 205, 413, etc., for the second cube, and so on, we get a 5^4, which has 20 contiguous rectilinear summations through any cell, viz., the 4 directions parallel to the edges and the whole of the 16 three-dimensional diagonals parallel to the great diagonals of any cubical section. If the reader will write out the four aspects of the octahedroid, in the way already explained, he will be able to verify this statement. As an example, the 20 summations through the cell containing the number 325, which lies in the first plate of the first cube of the P_1 aspect, are here shown:

ROW	COLUMN	LINE		CUBICAL DIAGONALS															
				P_1 ASPECT				P_2 ASPECT				V ASPECT				H ASPECT			
325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325	325
513	8	508	512	534	388	607	3	538	392	611	7	533	387	608	4	413	103	507	509
201	466	216	204	143	576	169	456	126	589	152	469	141	579	166	458	501	406	219	218
419	154	404	416	477	44	451	164	494	31	468	151	479	41	454	162	119	214	401	402
107	612	112	108	86	232	13	617	82	228	9	613	87	233	12	616	207	517	113	111

Since there are 20 magic summations through each of the 625 cells and each summation involves 5 cells, the total number of different symmetrical magic summations in this octahedroid is 2500. This does not include the 8 central hyperdiagonals, which are also magic, for this is not a symmetrical property since *all* the hyperdiagonals are not magic.

The next odd order, 7, was the one which Frost attacked. Glass models of his 7 cubes were for many years to be seen at the South Kensington Museum, London, and possibly are still there. He does not appear to have completely grasped the analogy between magics in 3 and 4 dimensions, and from the account he gives in *The Quarterly Journal,* he evidently assumed that the figure was magic on all its plane diagonals. Actually it is magic on all plane diagonals only in the P-aspect; in the other 3 aspects it is nasik in one set of planes but only semi-nasik in the other two sets of planes, therefore of the 12 plane diagonals through any cell of the octahedroid only 9 are magic.[9] Frost obtained his figure by direct application of the method of paths; the present writer using the method of formative square has obtained an example with one additional plane magic diagonal. It is shown as a great square of order

[9] Probably the reader will have already noticed that although there are 4 aspects, and 6 plane diagonals appear in each aspect, yet there are only 12 plane diagonals in all, since, with this method of enumeration, each diagonal occurs twice.

49, magic on its 49 rows, 49 columns and 98 diagonals, and 49-ply, that is *any* square bunch of 49 numbers gives the same sum as a row or column. The 49 subsidiaries are equally weighted nasiks, magic on their 7 rows, 7 columns and 14 diagonals. If the subsidiaries be taken up along the Indian paths, as in the previous examples, we get 7 cubes forming an octahedroid of order 7. This is magic on the 4 directions parallel to the edges, is completely plane nasik in the P_1 and P_2 aspects, and in the other two aspects it is nasik in two sets of planes and crude in the third set. Therefore of the 12 plane diagonals through any cell 10 are magic. It is practically certain that we can go no further in this direction with this order, but by giving up the magic plane diagonals we can, as with 5^4 above, obtain a larger number of magic summations on the higher diagonals.

When we consider the even orders we find those $\equiv 2 \pmod 4$ of little interest. The powerful methods used for the other orders are now useless if we insist on using consecutive numbers: we must employ other methods. Professor Kingery's Fig. 4 cannot be made into a magic octahedroid by any shuffling of its subsidiaries. The best methods here, are either to use an extension of Thompson's method of pseudo-cubes, as employed by Mr. Worthington in his construction of 6^3 (*The Monist*, XX, pp. 303-309),[10] or, best of all, to use the method of reversions.

With orders $\equiv 0 \pmod 4$ we can give a greater number of ornate features than with any other orders. We quote one example below (Fig. 6).

The columns of Fig. 6 give the 4 cubes of an octahedroid of order 4, which is crude in plane diagonals, but is magic on every other contiguous rectilinear path, it has therefore 28 such paths through each cell. The 28 magic paths through the cell containing the number 155 are displayed below.

ROW	COLUMN	LINE	...	CUBICAL DIAGONALS															
				P_1 ASPECT				P_2 ASPECT				V ASPECT				H ASPECT			
155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155
38	70	98	101	2	50	242	194	5	53	245	197	77	125	113	65	36	33	225	228
91	171	151	154	103	103	103	103	106	106	106	106	166	166	166	166	86	86	86	86
230	118	110	104	254	206	14	62	248	200	8	56	116	68	80	128	237	240	48	45

[10] It was by this method that Firth in the 80's constructed what was, almost certainly, the first correct magic cube of order 6. *Mr. Worthington's introduction of magic central diagonals on all the faces is new. Though, of course, not a symmetrical summation, this is a very pleasing feature.*

HYPERDIAGONALS							
155	155	155	155	155	155	155	155
256	208	16	64	253	205	13	61
102	102	102	102	102	102	102	102
1	49	241	193	4	52	244	196

1	128	193	192
240	145	48	81
49	80	241	144
224	161	32	97

254	131	62	67
19	110	211	174
206	179	14	115
35	94	227	158

4	125	196	189
237	148	45	84
52	77	244	141
221	164	29	100

255	130	63	66
18	111	210	175
207	178	15	114
34	95	226	159

248	137	56	73
25	104	217	168
200	185	8	121
41	88	233	152

11	118	203	182
230	155	38	91
59	70	251	134
214	171	22	107

245	140	53	76
28	101	220	165
197	188	5	124
44	85	236	149

10	119	202	183
231	154	39	90
58	71	250	135
215	170	23	106

13	116	205	180
228	157	36	93
61	68	253	132
212	173	20	109

242	143	50	79
31	98	223	162
194	191	2	127
47	82	239	146

16	113	208	177
225	160	33	96
64	65	256	129
209	176	17	112

243	142	51	78
30	99	222	163
195	190	3	126
46	83	238	147

252	133	60	69
21	108	213	172
204	181	12	117
37	92	229	156

7	122	199	186
234	151	42	87
55	74	247	138
218	167	26	103

249	136	57	72
24	105	216	169
201	184	9	120
40	89	232	153

6	123	198	187
235	150	43	86
54	75	246	139
219	166	27	102

Fig. 6.

But this does not exhaust the magic properties, for this figure is 4-ply in every plane section parallel to any face of the octahedroid. If the reader will examine the figure in its four aspects he will find that 6 such planes can be drawn through any cell, and since a given number is a member of four different 4-ply bundles in each plane, it follows that each number is a member of 24 different bundles. If we add the 28 rectilinear summations through any cell we see

that each of the 256 numbers takes part in 52 different summations. The total number of different magic summations in the octahedroid is therefore $\frac{256 \times 52}{4} = 3328$. The six planes parallel to the faces through 155 are shown in Fig. 7, and from them the 24 different bundles in which 155 is involved can be at once determined.

11	118	203	182
230	155	38	91
59	70	251	134
214	171	22	107

19	110	211	174
230	155	38	91
31	98	223	162
234	151	42	87

131	118	143	122
110	155	98	151
179	70	191	74
94	171	82	167

25	104	217	168
230	155	38	91
28	101	220	165
231	154	39	90

137	118	140	119
104	155	101	154
185	70	188	71
88	171	85	170

145	110	148	111
104	155	101	154
157	98	160	99
108	151	105	150

Fig. 7.

The reader might object that the border cells of a square section cannot be involved in 4 bundles of that section; but this would be to overlook the congruent property. The number 107, which occupies a corner cell of the first section given above is contained in the following bundles:

251	134	134	59	22	107	107	214
22	107	107	214	203	182	182	11

It is noticeable that the four corner cells of a square form one of its 4-ply bundles.

It would have been desirable to indicate the methods by which the above examples have been constructed, but exigencies of space forbid. The four orders dealt with, 3, 5, 7, 4, were all obtained in different ways. Fig. 6 was constructed by direct application, in four dimensions, of the method of paths; in fact, it is the octahedroid

$$\begin{vmatrix} 2 & 2 & 2 & 1 \\ 2 & 2 & 1 & 2 \\ 2 & 1 & 2 & 2 \\ 1 & 2 & 2 & 2 \end{vmatrix}_4.$$

The whole of its magic properties may be deduced by examination

of the determinant and its adjoint, without any reference to the constructed figure. There is therefore nothing empirical about this method.

C. PLANCK.

HAYWARD'S HEATH, ENGLAND.

BJOERKLUND'S "DEATH AND RESURRECTION."

The résumé and discussion of the above book* with reference to and contrast with the writings and position of Dr. Carus, by Mr. J. E. Fries in *The Monist,* April issue, is deeply interesting. The book itself is absorbingly so, evidencing large knowledge in research and much independent thinking. It may not be conceded, however, as convincing in establishment of the thesis in theory—the soul as a thing or matter of the cells. The author's discussion scarce touches the soul, stopping short of the thing in pursuit, but with an incompetent substitute. Cells are given individual but not *independent* existence, and on that ground alone the cell is incompetent as basic to the soul.

Mr. Fries begins with the "life-force," and the Editor's earlier published article "Life and the Soul," and the point in antagonism with Dr. Carus is emphasized that "life has no roots whatever in the material world." Surely "a strange statement" this! Dr. Carus is quoted as follows: "Living bodies consist of the very same materials of which the rest of the world is composed," which physics and chemistry make certain. The "life phenomenon is *sui generis*"; this, too, science concedes. Again "...life is a manifestation of energy which forms a category of its own" etc., a not pronounced materialism this, surely. Here, then, is life-force *sui generis* yet natural, no mysticism or supernaturalism involved or required.

To the somewhat equivocal question, "With no other resources than the material world to fall back upon, how then did life grow out of matter and physical energy?" it is answered: "Surely we must look beyond the boundaries of the visible world." To this it may be replied: Energy is not of category with matter and the visible. Within the cosmic world, however, are found both matter and energy, and whatever other factor may be essential to the "origin and substance of life." The cosmical is the natural, and

* *Death and Resurrection from the Point of View of the Cell-Theory* by Gustaf Björklund. Translated from the Swedish by J. E. Fries. Chicago, Open Court Pub. Co., 1910.

with no necessary supernaturalism, in factor or fact. Science is leading to the monism of but *one* energy or force in the universe—varied in form or manifestation. To pit the psychic or spiritual against the material, with kinds of force in consonance, involves in confusion, and a divided house that cannot stand.

Soul and life, consciousness and energy are not synonymous or correlative. But neither is soul nor consciousness nor thought without energy. Kant's *pure* and *transcendant* are simply categories of degree, not kind. All reason is reasoning, all sentiment is sentimental, be it angelic or devilish.

It follows, then, that there is no need to go outside the cosmical world to find the roots or elements of life, or the source and origin of all that is possible to thought manipulation. Life, and the human soul and mind are the most natural of things, and the supernatural, at least in the banal sense it has acquired, may be dispensed with and no loss felt.

Mr. Fries quotes from the book: "...all organic matter is a product of art, that is, a product which the forces of nature cannot spontaneously produce...a foreign interference is necessary." Now, it is certain that there are no other than the forces of nature to effect these products. As certain also is there the psychic or *art* factor in the effecting of the organic matter. But this psychic or *art* factor is *not* a *living will,* or, as later on designated, soul, as the author should himself have seen. He says: "Will and physical forces then stand against each other as two fundamentally and radically different causes. A will may neglect to do what it ought to, may be idle, industrious, undecided; a physical force cannot leave undone what it has to do, can never be called idle, industrious or undecided." To be sure that is so. Such a "will," therefore, cannot be in organic connection with a physiological or living thing, because it achieves its end as an organism harmoniously, and completely in and of itself. No factor of the physiological organism *stands against* any other factor in their entire *ensemble,* as such *organization* is regal here. The *end,* purposed in the organic is not present to the organism in the *form of idea* (W. R. Sorley). There is no *soul,* no *living will* in the physiological; notwithstanding there is the psychic or art factor, *objective* with all other factors of the organism as such, or in its primalism. This objective psychic or art factor is a qualitative property or power of life-force and may well constitute it *special,* having this specific manifestation. Being of and with the life energy, it is ubiquitous as the cell and initiates the directivity to the func-

tional intracellularly—as evidenced by all physiology, plant or animal.

Björklund's error is simple enough in his premises, and he has a *soul* in every cell—his explaining away a multitude of souls is quite inconclusive. His error is in not seeing that life-force, *sui generis* as it is, is simply the physical energy—he is pleased to term it—in directivity by complexing of the psychic or *art* factor, which he interprets as *soul*, and Sir Oliver Lodge, equally mistaken, designates the "formative principle of the organism."

Life-force, without *soul*, or *living will*, is competent to the whole of the physiological as a phenomenon. Possibly *feelings*, correctly interpreted, but certainly not *sentiments* and *thoughts* are the manifestations of life-force. Life-force as embodied in living matter in germ status of every grade, is fully competent to the whole of the physiological of its grade, but of *nothing beyond*. The "foreign interference" of the author, correctly conceived and stated, is *a new departure in the evolutional*. The origin of life marked an epoch in cosmic evolution. The advent or coming into entity of the human soul was another "foreign interference" equally epochal evolutionally. This was attained by the complexing of the physiological with a psychism *subjective* in status and rôle. Initial and basic in the concept of soul and mind is this *subjectivity*. The physiological is wholly *objective*—contingency and the stereotyped obtain, directed by the psychic factor which is a *constituent of the organism*. The fact of the *go* of the physiological is the hint of the soul and mind, yet there is no *soul* or *living will*, because all is *objective*. Let the mind sweep through all the vault of the cosmos, and but a single subjective factor or phenomenon is found—*man*, the human soul, a living will. He is *subjective*; he does things; mind is creative. The soul or mind is distinct in concept and in essence, in being, from the physiological. In non-connection, yet in vital and organized relation and association with, and in evolution by means of the organization effective in the physiological. The cell provides for, is effective in, development of body and brain; but soul and mind are not of the cell or brain. Soul, a psychism in subjectivity has basis in immediacy with the functional. The theory and discussion of it in *Death and Resurrection* must be reconsidered and reconstructed to be in consonance with the facts, and so to be of "any special value to religious or emotional life" (Carus).

JOSEPH CLEMENTS, M. D.

WICHITA, KANSAS.

THE HISTORICITY OF JESUS.

IN COMMENT UPON THE THEORY OF PROF. WILLIAM BENJAMIN SMITH.

Theology seems to be sufficiently remote from mathematics, and yet it appears that the two join hands in the mind of an American scholar, William Benjamin Smith, who by profession is a mathematician but by preference a theologian. He is a professor of Tulane University in New Orleans, La., where for many years he held the chair of mathematics and has only recently been transferred to the faculty of philosophy. He takes considerable interest in the philosophy of mathematics, but has it tempered by studies in the origin of Christianity. His special attention is concentrated upon the figure of Jesus in the Gospels, and he has published a work in German under the title "The Pre-Christian Jesus" (*Der vorchristliche Jesus*) in which he attempts to prove that Jesus never lived. His theory differs, however, from older ones which claim that Jesus was a solar myth, in that his studies are based upon a thorough text criticism of the New Testament supported by stupendous scholarship in the field of patristic and Apocryphal literature.

Professor Smith has stirred Germany through Professor Drews of Carlsruhe, Baden, who not only published a book entitled "The Christ Myth," but also began a campaign of lectures in which he challenged the old believers to defend the historicity of Jesus. Orthodox Berlin was shaken from its lethargic indifference by his debates which attracted large crowds and filled many columns of the daily press.

Professor Drews bases his contention mainly upon Professor Smith's book, and in recapitulating the state of things he expresses his views as follows:

"Finally the American William B. Smith, in his work *Der vorchristliche Jesus* (1906) has cast so bright a light on a number of weighty factors in the origin of Christianity and has illuminated so many points that permit us a deeper insight into the actual course of events that we gradually begin to see clearly in this matter" (page iii in the preface).

It is natural that this attack on the historicity of Jesus should have found many antagonists, but strange to say it found among the very opponents of Professor Smith's theory some who advocated its investigation. Prof. A. Jülicher, well known among theologians, makes the following statement in his pamphlet "Did Jesus Live?" page 1:

"In the last decade, after some predecessors of little consequence, a series of distinguished savants in America and Germany have come forward with powerful attacks upon the whole traditional conception of Jesus, foremost among them William B. Smith in his *Der vorchristliche Jesus.*"

The radical press shows itself inclined to endorse the position of Smith, as for instance Wilhelm von Schnehen in *Das freie Wort,* Vol. VIII, No. 16, page 623, who praises Smith's theory as a "decisive blow" to the antiquated views, but liberal theologians have come forth as his most doughty enemies. And this is but natural, for while Smith sees in Jesus the humanization of a god, the liberal Christian sees in Christ the deification of Jesus, a noble and pure hearted idealist. Unitarians may not believe in Christ, the God made flesh, but they believe in Jesus, the man, a paragon of moral perfection; and the humanity of Jesus together with his historicity is the salient point of their creed.

Professor Smith is known to our readers through several articles published in *The Open Court* and *The Monist,* and it is not easy to refute his theories. We agree with him so far as his positive contentions go, but we demur to his negation. We agree that the Christ ideal is pre-Christian. The idea of a Saviour among the pagans and the hope for the Messiah among the Jews do not date at the beginning of the Christian era, but can be traced almost everywhere in profane and sacred literature, not of the Jews alone, but mainly of the Gentiles; and this ideal of a Saviour has entered into the fabric of the story of Jesus as preserved in the Gospels.

Professor Smith, however, goes one step farther. He claims not only the pre-Christian existence of the Christ ideal, but also of a Jesus, and there are many things which speak in his favor. Among them he maintains for instance that the definite article prefixed to the word Jesus indicates that "Jesus" like "Christ" was a title and not a name; therefore he is spoken of as "the Jesus." Further he would explain the whole story of the Gospels as being the result of symbolism, and in the present article he discusses evidences that can be deduced from the silence of Josephus and Tacitus.

Jesus is nowhere mentioned in the profane literature of the Gentiles; he is unknown to history. This is a truth accepted by scholars, but not universally known, and its significance has not yet been pointed out. Professor Cornill, one of the higher critics, who is an avowed Christian, says:

"I assume that my esteemed readers are already aware of the

fact that Abbot Dionysius Exiguus, who in the sixth century calculated the Christian era according to which we still universally reckon time, erred in his establishment of the year of Christ's birth, placing it several years, probably five, if not seven, too late. It is positively certain that Herod died in the year 4 before our era; if, therefore, Jesus was born during his reign—and there is no reason for doubting this tradition—the conclusion is unavoidable that the date commonly assigned for the birth of Christ is wrong. The place of Jesus's birth is just as much a matter of uncertainty as the time; and so is the year of his death,—in this latter point reports and estimates vary a matter of seven years, from 29 to 36 A. D.

"It is downright providential that we know so little from the historical and biographical point of view concerning this greatest life that was ever lived on earth. Thus every possibility is to be precluded of our falling into the delusion that we know him in knowing the date of his birth and of his death and the outward circumstances of his life; he is to stand before us simply in his work.

"The life and activity of Jesus fell into the period of Jewish history which is to occupy our attention in this chapter, and his activity was possible only on the soil of Israel and among the Jewish people; but yet a history of the people of Israel is not the place in which to speak of him. He swept across the hopelessly darkened sky of Israel like a meteor, flashing and vanishing; he had no effect upon the history of the Jewish people, and the fact that he did not do this, that he deliberately refused to do so, became, humanly speaking, his doom."

Though Jesus was historical, though he was a real man, he was not an historical figure. His life was passed in the obscurity of a small sect without entering as a factor into the national life of either Galilee or Judea, and his death at Jerusalem did not cause a ripple in the history of the country; but for all that he may have existed and have been crucified. He may have played an important part in the events of the Nazarene sect, a small community of dissenters who were a branch of, or kin to, the Essenes known to Josephus and Pliny, and probably identical with the Ebionites, the Sect of the Poor. This possibility, which we deem quite probable, Professor Smith rejects as impossible, claiming that Josephus ought to have known something of the fate of Jesus.

The Gospel of Mark, in spite of the many additions which a mythological conception of the Messiah has introduced, appears to contain a foundation of real facts. There are too many features of

a personal nature and too many statements incompatible with the Messiah ideal which would not have been invented if the story were purely mythological as Professor Smith assumes. We cannot help assuming that the author was inspired by the belief in a real personality who lived in Galilee and died a martyr's death in Jerusalem. He may have his information second hand which accounts for the embellishment of miracle, and in addition to the Gospel of Mark we have indications of the historicity of Jesus in Pauline literature. Professor Smith may be right that the epistles of St. Paul are later compilations, but for all that we must assume that their nucleus was genuine, that Paul existed and though he did not know Jesus personally, he knew Peter, and he had heard of James, the brother of Christ. Professor Smith tries to explain this expression and other references to the family of Jesus by saying that the term brother was more a title of religious respect, and that in a certain sense all Christians were brothers of Christ, but I fear that his explanation can not be accepted, for the text does not allow such interpretation. These references in the New Testament to the family of Jesus are the more important as they stand in contradiction to the early dogma of the virgin birth of Jesus, and they were always a stumbling block to the Roman Catholic theologians who tried their best to weaken the force of these terms and to explain them away.

The editions of both Josephus and Tacitus contain passages on Jesus Christ, of which however those in Josephus have been rejected as later insertions. But the passage in Tacitus has scarcely been questioned, and Professor Smith is the first to throw the shadow of doubt upon this famous passage of the old truth-loving Roman historian.

We discuss the problem of the Gospels and kindred subjects in the current number of *The Open Court*, and will here only state that we are not inclined to doubt the historicity of Jesus. We accept the theory of the pre-Christian Christ, and believe that the features attributed to Christ have one by one been fixed upon the figure and inserted into the story of Jesus. The people of the age expected a Saviour who should accomplish certain things, should undergo certain sufferings, should teach certain doctrines, should fulfil the predictions of the prophets, and be distinguished by definite occurrences.

We assume that there was a certain Galilean by the name of Jesus, and that he was a leader in the sect of the Nazarenes. He was a mental healer who according to the current theory of the times

believed that diseases were due to demons, and so he cured his patients by exorcism. We may fairly well assume that he often succeeded, but the Gospels contain indications that he also met with disappointments. He had a contempt for the Gentiles and believed in the absolute divinity of the Jewish law even to the diacritical points of the Scriptures, but he hated its official representatives, the scribes and Pharisees, whom he called a generation of vipers.

When Saul of Tarsus became convinced that this Jesus was the Christ, the story of his life was seen in a new light and the notions of the Christ were woven into it.

One of the most palpable inventions in the life of the expected Saviour was the story of his persecution soon after his birth. Among the pre-Christian saviours from the Hindu Krishna, the Buddhist Gautama, the Persian Zoroaster, and the gods of Greek paganism, there is no one in whose life the newborn babe has not been persecuted by a wicked tyrant who feared to lose his throne on the advent of a new hero. The story of the massacre of the innocents is in all its main features identical with the slaughter of the babes in the myth of Krishna, and also in the legend of Buddha. In order to be proved to be the Christ, or the Saviour, or the Messiah, Jesus as a babe had to experience the same persecution and so this same story has been inserted into the Christian Gospels.

This we have granted, and Professor Smith has done much to corroborate the truth of the pre-Christian Christ ideal, but in our opinion he has not succeeded in proving the non-existence of Jesus of Galilee who lived approximately at the time to which Christianity assigns the life of Jesus. The Jesus of the Gospels must have been born a little earlier than the year one of our era, and his death is not merely based upon the authority of an obscure author but is well accredited through the Pauline epistles, and the correctness of the date as having taken place under Pontius Pilate can not easily be doubted.

The strongest evidence in favor of the historicity of Jesus, in our opinion, consists in the evidence we have in the statements of the Gospels, that the Jesus of the Gospels in many respects did not agree with the expectation of a universal Saviour. He was a Jew and believed in the narrowest conception of Judaism as appears from the anti-Gentile tendencies attributed to him in the New Testament, and he believed that the day of judgment when the son of man would come in the clouds of heaven was so near at hand that not all of his audience who were listening to him would die before all

who wish to apply the theory of probabilities to practical questions that these *Elements* have been written. The book can be understood from beginning to end by any reader familiar with the definition of the determinate integral and the concepts of algebra and geometry which this definition presupposes. The work is divided into three parts dealing respectively with Discontinuous Probabilities, Continuous Probabilities and Probabilities of Causes.

HERBERT SPENCER'S GRUNDLAGEN DER PHILOSOPHIE. Von *Dr. P. Häberlin.* Leipsic: Barth, 1908. Pp. 205. Price, 5.40 m.

In the author's opinion the world has been slow in recognizing the significance of Spencer, and his influence upon the thought of the present and the progress that has been made. He believes that this English philosopher (whom he calls the "philosopher of evolution") has been especially ignored in Germany, and in the present work he undertakes to offer a careful analysis and critique of the *First Principles.* Some of the chapters treat of the nature of philosophy and epistemological principles, so-called agnosticism and universal evolution.

OLD CRITICISM AND NEW PRAGMATISM. By *J. M. O'Sullivan.* Dublin: Gill, 1909.

Kant is here set forth as the exponent of the "old criticism," and after a wordy comparison of the treatment of the category of quantity by Kant and Hegel and a discussion of Kant's treatment of causation, the author finds it possible to arrive by the implications of these characteristic doctrines of Kant at the individualism and pluralism of pragmatism. He treats it as an epistemological method in its relation to criticism. Instead of finding pragmatism, however, a valuable method to substitute for Kant's critical system he finds that it grows increasingly inadequate and calls it a "confession of the futility of all logic."

ABRISS DER GESCHICHTE DER PHILOSOPHIE. Von *Chr. Joh. Deter.* 9th ed. Berlin: Weber, 1910. Pp. 178. Price 3.20 m. Bound 4.20 m.

This very satisfactory summary of the history of philosophy has been revised and brought up to date in its ninth edition by Dr. Max Frischeisen-Köhler. An explanatory index serves as a concise philosophical dictionary, but lacks page references. A comprehensive list of names completes the volume.

"Jean-Jacques Rousseau, a Forerunner of Pragmatism," which Prof. Albert Schinz, of Bryn Mawr, contributed to *The Monist* of October 1909, has been published in pamphlet form by The Open Court Publishing Company. A number of typographical errors in the *Monist* article which inadvertently occurred through delayed proofs, are here corrected, and many passages have been otherwise revised and altered by the author. Three Appendices, "Rousseau and Condillac," "Rousseau and Madame de Genlis," and "An Unknown Phase of Rousseau's Thought," have been added to the original form of the essay and contain many interesting points. The "Unknown Phase" mentioned in the third appendix is the fact that "Rousseau seems to be in favor of pragmatic ignorance for the masses, while holding that for the select few, science is desirable and desirable in the interest of all."

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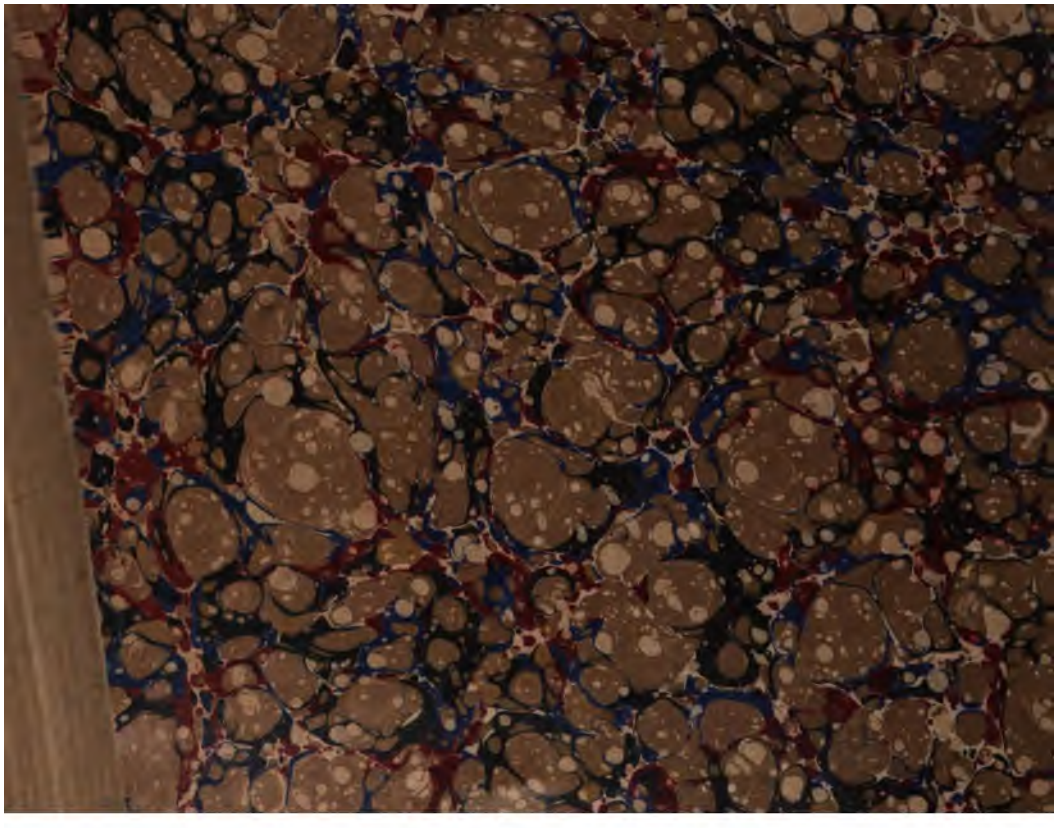

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